BUSH MURPHY

SERVICE INFORMATION

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SINGLE STANDARD COLOUR TELEVISION RECEIVERS incorporating **Main Chassis Type A823AV and employing VARACTOR TUNING**

Supplement to Single Standard Colour Television Manual TP1741

General Information

The range of receivers covered by this Service Information incorporate main chassis type A823AV and varicap tuner units in place of the mechanical tuners fitted to the earlier range of single standard colour receivers. These receivers are basically similar to the earlier range but use the Z582 I.F. and Sound Output panel instead of the A809 or Z182 panels; and the Z584 Decoder instead of the A807 or Z180 panels. Information noting the differences between the Z582 and the Z182, and between the Z584 and the Z180 are given below.

The principal information contained in this publication concerns the varicap tuner and a.f.c. panel type Z513 (incorporating a.f.c. panel type Z512 and u.h.f. tuner type Z511). This standard unit covers the u.h.f. bands 4 and 5, but if required, these receivers may be converted for operation on v.h.f. bands 1 and 3 by fitting conversion kit type Z564 (which includes unit type Z570, which in turn incorporates a.f.c. panel Z512 and v.h.f. tuner type Z565). The v.h.f. unit type Z565 is manufactured by Mullard Ltd: no detailed information on this unit is included in this publication.

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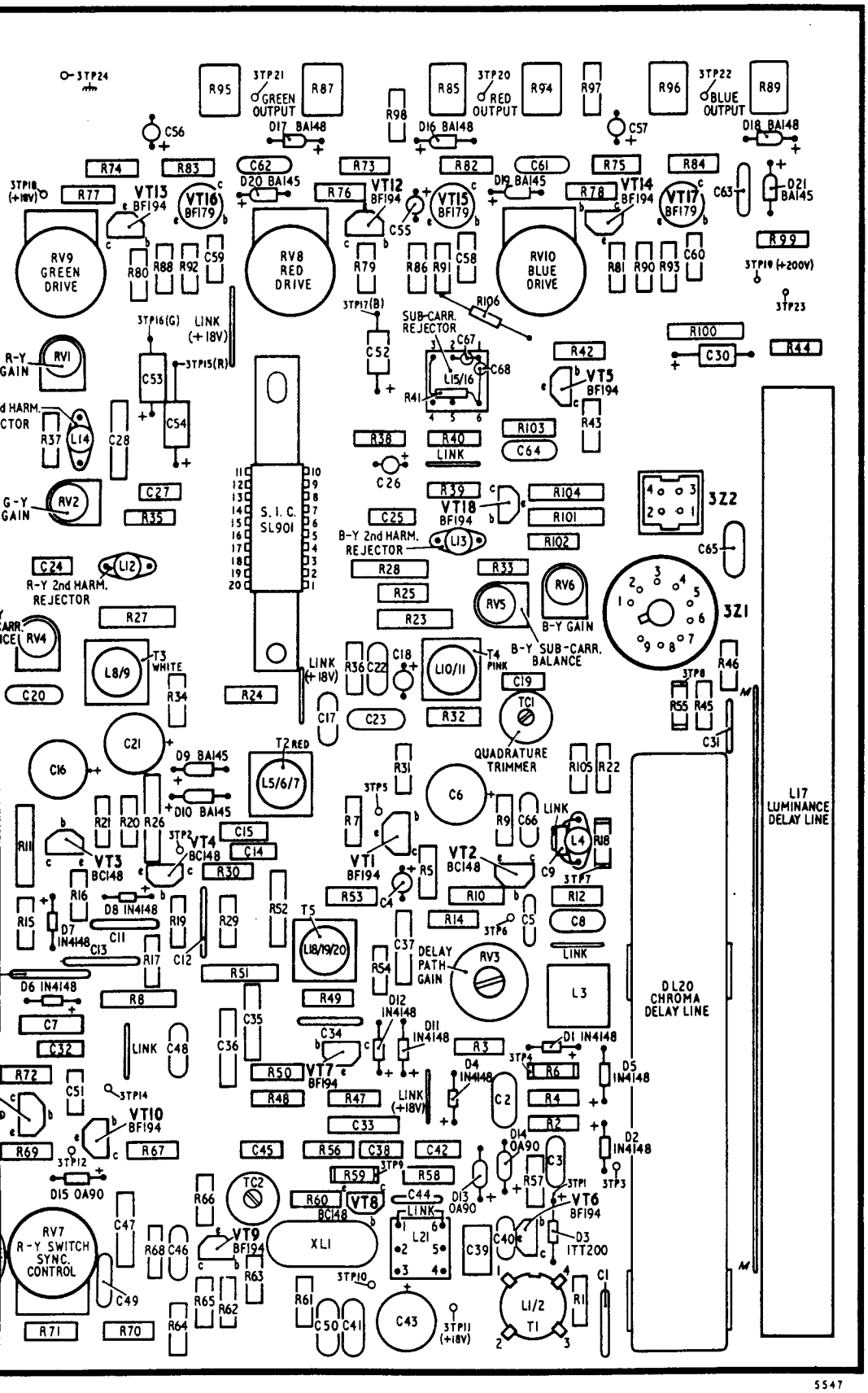
PRINTED PANEL VARIANTS

I.F. and Sound Output Panel, Type Z582.

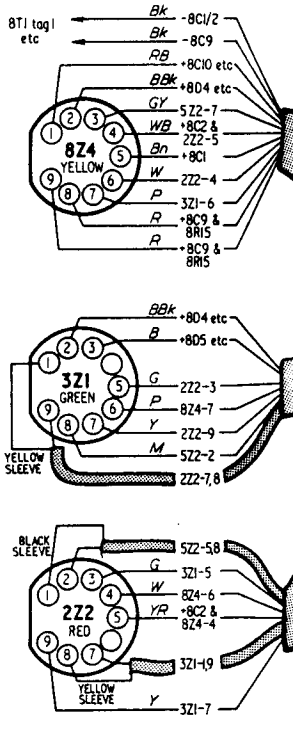
This panel is identical to panel, type Z182 apart from the inclusion of a pre-set Colour control mounted on the panel adjacent to the plug 2Z3. This pre-set control replaces the function served by the Customer Colour control on the Z182 panel. Also as part of this change resistor 2R35, 18kΩ, is moved to holes adjacent to, and in series with the pre-set control.

Decoder and R.G.B. Drive Panel, Type Z584.

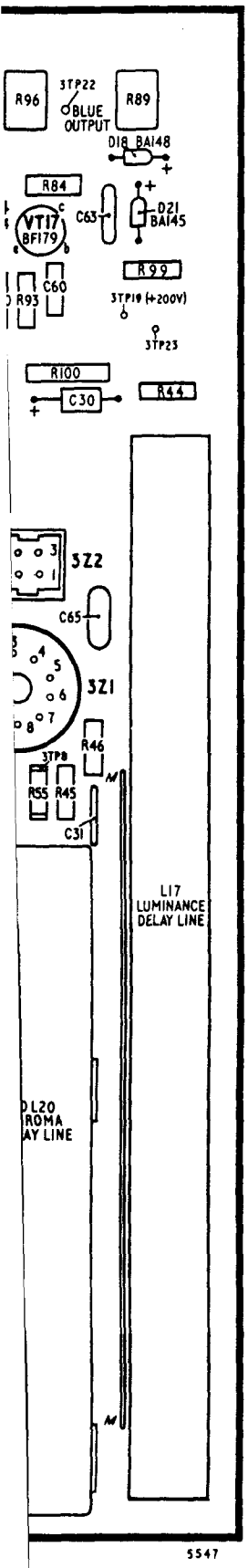
This panel is a development of the decoder type Z180. The Z584 incorporates provision for controlling picture saturation at high level instead of the low level control of the chrominance amplifier employed on the Z182 i.f. panel. This development involves the replacement of the LK1 on the Z180 panel with a 0·1μF capacitor, 3C65 Part Number 2601 0070 and the connection of the Customer Colour control, to two of the test point pins, 3TP27 and 3TP25, these pins becoming plugs 3Z11 and 3Z6 respectively. The Customer Colour control now operates at high level and controls the gain of the chrominance channel within the SL917A s.i.c. This change has necessitated amendments to be made to the decoder Adjustment Procedure, see Page 3.

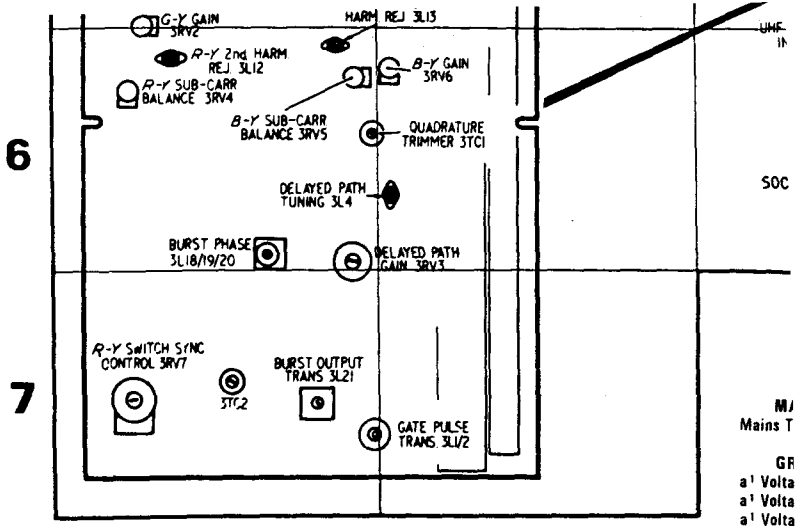


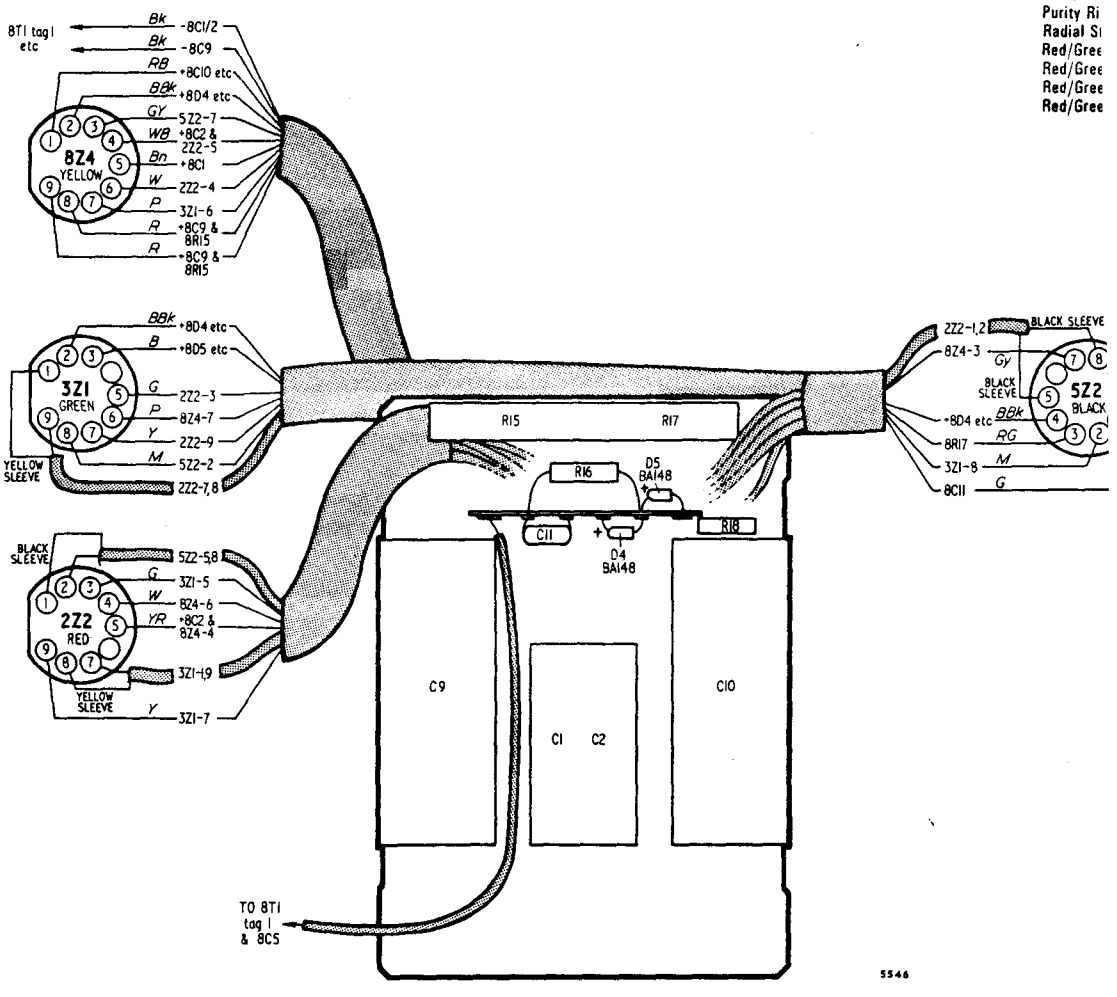
R.G.B. DRIVE PANEL Type A807



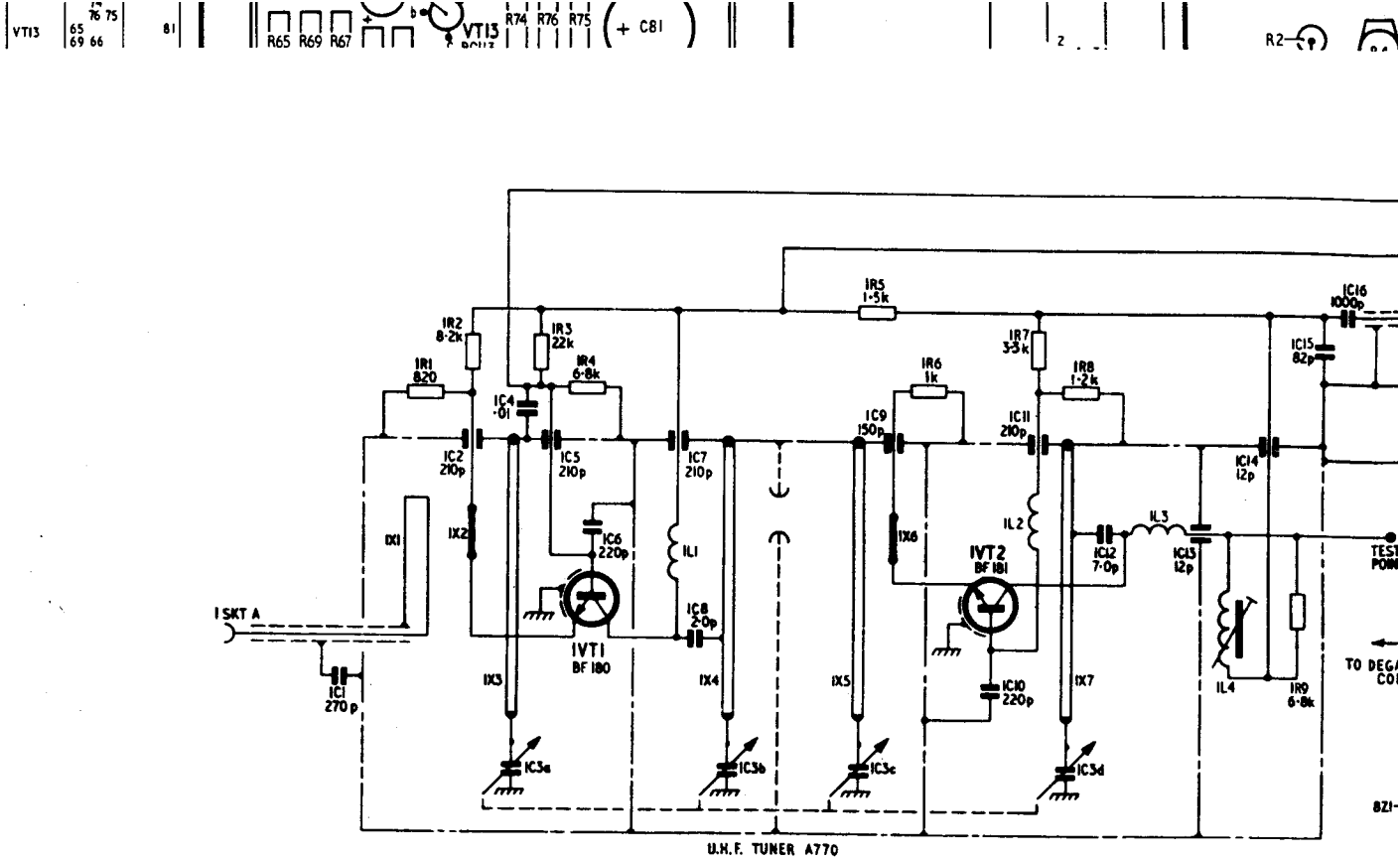
CAPACITOR PLA

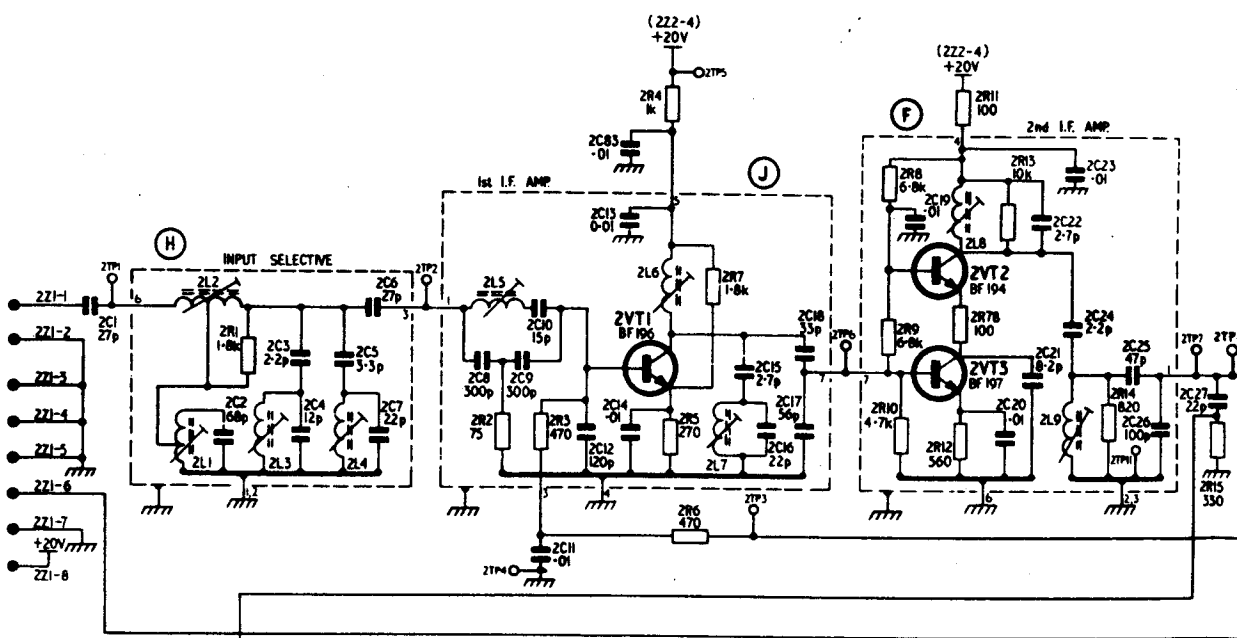


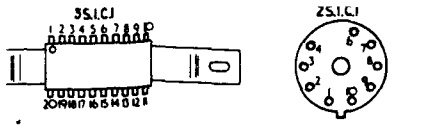


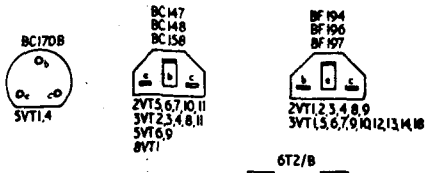


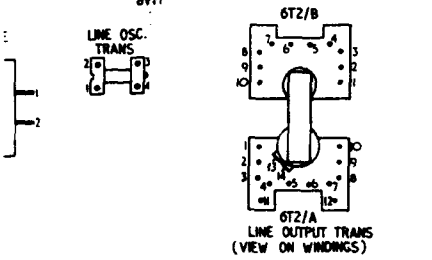
CAPACITOR PLATE & CABLEFORM

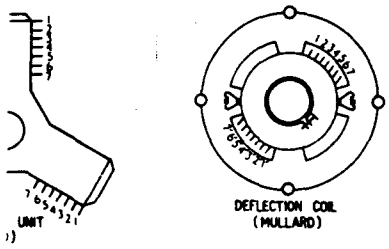

U.H.F. TUNER A770
1SKT A
1VT1 BF 180
1VT2 BF 181
IC1 270p
IC2 210p
IC3a
IC3b
IC3c
IC3d
IC4 ·01
IC5 210p
IC6 220p
IC7 210p
IC8 2·0p
IC9 150p
IC10 220p
IC11 210p
IC12 7·0p
IC13 12p
IC14 12p
IC15 82p
IC16 1000p
IL1
IL2
IL3
IL4
IR1 820
IR2 8·2k
IR3 22k
IR4 6·8k
IR5 1·5k
IR6 1k
IR7 3·3k
IR8 1·2k
IR9 6·8k
IX1
IX2
IX3
IX4
IX5
IX6
IX7
TEST POINT
TO DEGAUSSING COIL

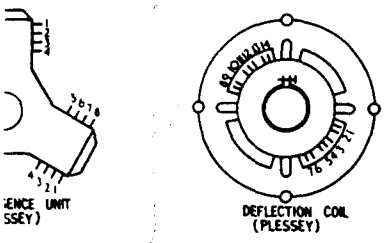

(2Z2-4) +20V
2TP5
2R4 1k
2C83 ·01
1st I.F. AMP
J
2C13 0·01
2VT1 BF 196
2L6
2R7 1·8k
2C18 33p
2TP6
2C15 2·7p
2C17 56p
2C16 22p
2L7
2R6 470
2TP3
2C11 ·01
2TP4
H
INPUT SELECTIVE
2TP1
2TP2
2Z1-1
2Z1-2
2Z1-3
2Z1-4
2Z1-5
2Z1-6
2Z1-7
+20V
2Z1-8
2C1 27p
2L2
2C6 27p
2L5
2C10 15p
2C8 300p
2C9 300p
2R2 75
2R3 470
2C14 ·01
2C12 120p
2R5 270
2R1 1·8k
2C3 2·2p
2C5 3·3p
2C2 68p
2C4 12p
2C7 22p
2L1
2L3
2L4
F
2nd I.F. AMP
2R11 100
2R8 6·8k
2R13 10k
2C23 ·01
2C19 ·01
2L8
2C22 2·7p
2VT2 BF 194
2R9 6·8k
2R78 100
2C24 2·2p
2VT3 BF 197
2C21 8·2p
2C25 47p
2R14 820
2C26 100p
2L9
2R10 4·7k
2R12 560
2C20 ·01
2TP11
2TP7
2C27 22p
2R15 330
2Z2-9
(2Z2-4) +20V
2R35 18k
2Z3-2
2RV4 2k
2Z3-9
2Z3-8
COL
2R36 1·5k
2R77 1k
CONTROLLED CHROMA I.F.
L
2VT7 BC148
2R38 10
2R39 10k
2C41 10
2R37 1k
2C42 10
2C44 100p
2R40 1k
2C43 ·01
2VT8 BF 196
2R41 680
2C45 8·2p
2L17
2C48 ·01
2C47 5·6p
2C49 27p
2L18
2R42 820
2C46 ·01
2R43 3·9k
2C50 30p
2TP8
2TP10
CHROMA I.F. DET. & CHROMA BANDPASS
M
2R49 100
2C55 ·01
2R47 100
2D5 0A 90
2L21
2C53 4·7p
2L19
2L20
2C51 ·01
2R44 10k
2VT9 BF 197
2R45 2·7k
2R46 680
2C52 ·01
2R48 2·7k
2C54 150p
2L22
2R50 15k
2R52 3·9k
2R54 1·5k
2L23
2VT10 BC148
2C56 220p
2R55 220
2R51 1·5k
2R53 100
2R56 100
2R57 560
TEST POINT

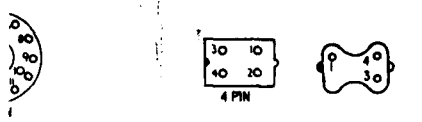


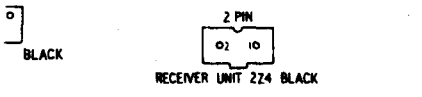












INDICATES CLOCKWISE ROTATION OF VARIABLE RESISTORS

LUBS & TRANSISTORS
N PINS
WED ON WINDINGS

RESISTOR VALUES IN Ω
CAPACITOR VALUES IN μF
UNLESS OTHERWISE STATED

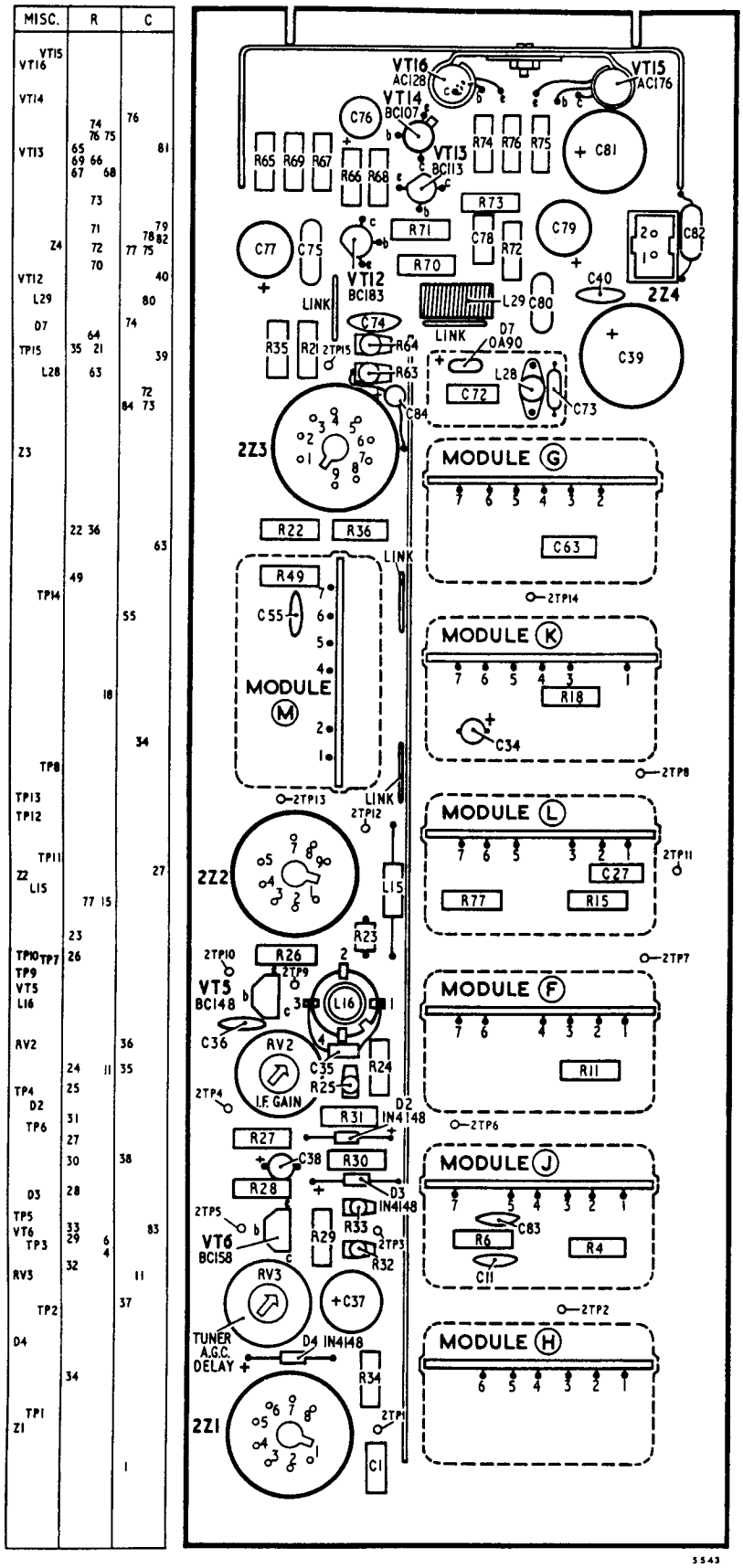
Ref.	Type	Electrode Voltage emitter	base	collector	Remarks
4VT1	BC117	−76·0	−74·0	2·0	
4VT2	BC171	−85·0	−78·0	−75·0	
5VT1	BC170B	0	0	9·0	
5VT2	BSY84	0·1	0	3·1	
5VT3	BC108	0	0	17·4	
5VT4	BC170B	2·6	3·1	17·5	
5VT6	BC147	5·8	6·0	16·0	
5VT7	BD131	0	0·4	20·0	
5VT8					
5VT9	BC148	0	0	1·2	
5VT10	AC128	1·5	1·3	0	
5VT11	BD131	21·5	22·0	35·0	
5VT12	BD131	0·75	1·4	22·0	
6VT1	BU105	N.T.	N.T.	N.T.	
6VT2	BU105	N.T.	N.T.	N.T.	
7VT1	AC128	—	—	—	Connected as diode
7VT2	AC128	—	—	—	Connected as diode

		Cathode	C. Gate	Anode	A. Gate
5THY1	BRY39	0	0	4·1	6·2

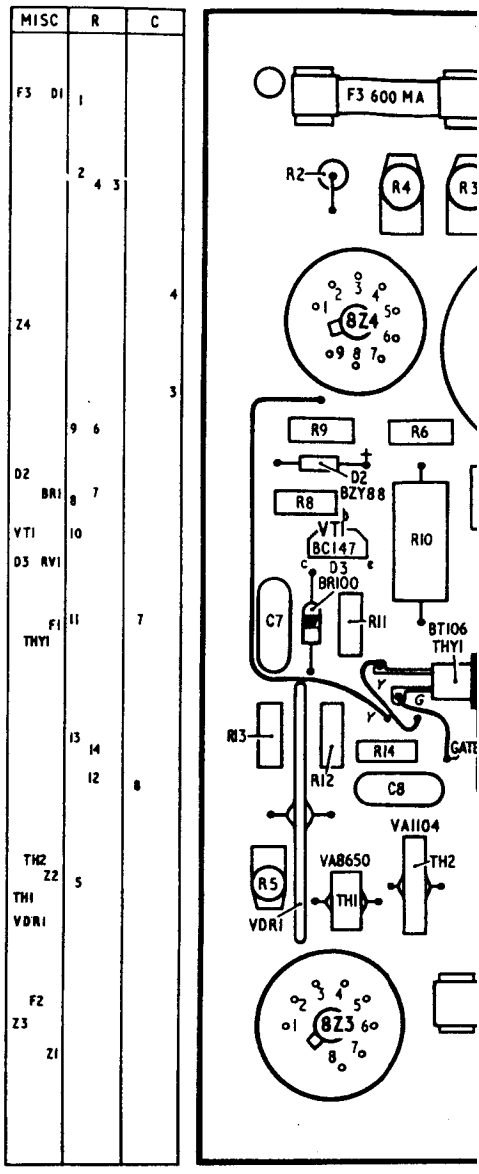
Ref.	Pin No.	Electrode	Voltage
4V1			
	1	Heater	6·3V a.c.
	2	Cath., Red	130
	3	Grid, Red	
	4	A^1, Red	
	5	A^1, Green	
	6	Cath., Green	130
	7	Grid, Green	
	8	No. Pin	
	9	A^2, Focus	5–8kV
	10	No. Pin	
	11	Cath., Blue	130
	12	Grid, Blue	
	13	A^1, Blue	
	14	Heater	Chassis

CIRCUITS DIAGRAM

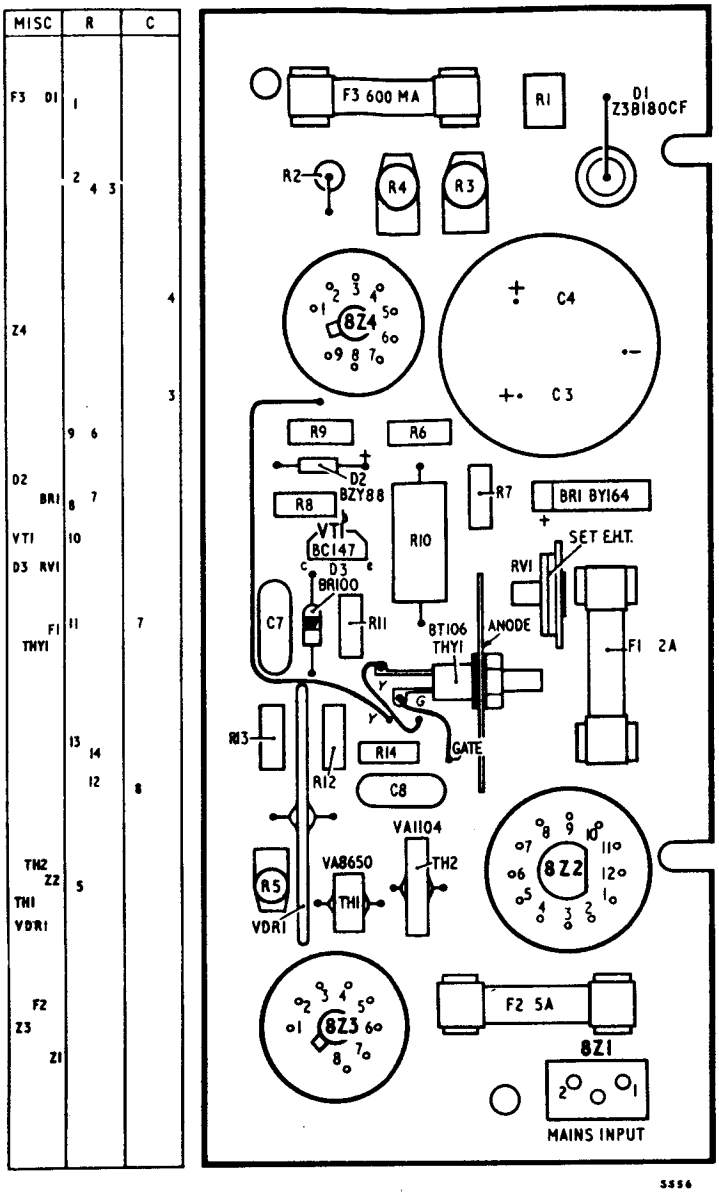
I.F. & SOUND OUTPUT PANEL Type A809



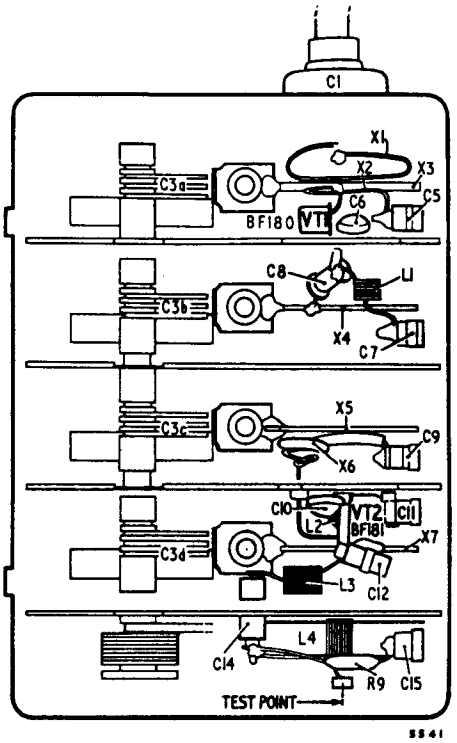
POWER SUPPLY PANEL Ty

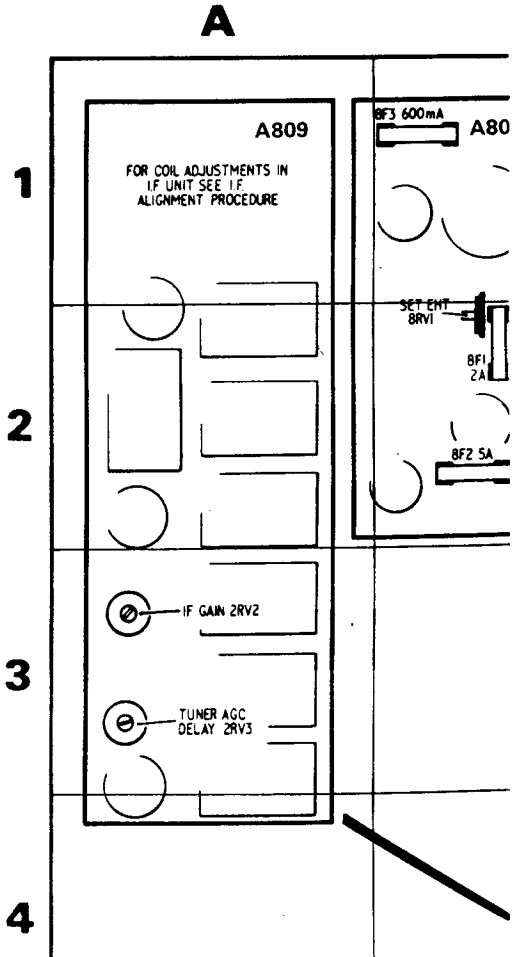


POWER SUPPLY PANEL Type A801

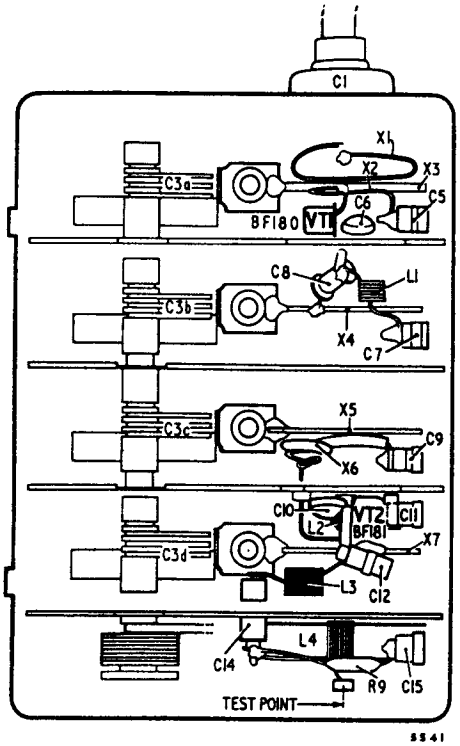


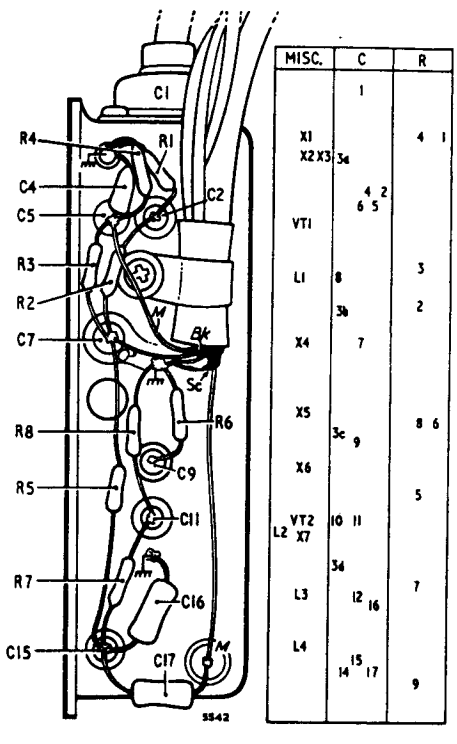
TUNER UNIT Type A770





TUNER UNIT Type A770

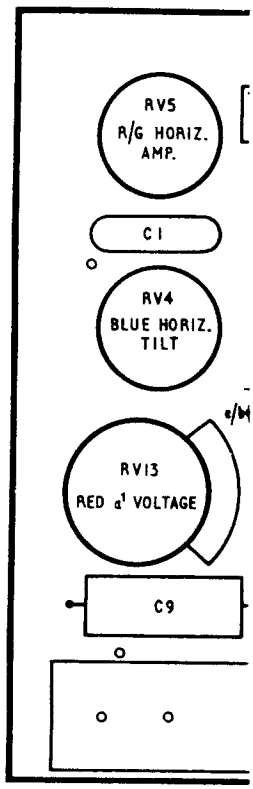


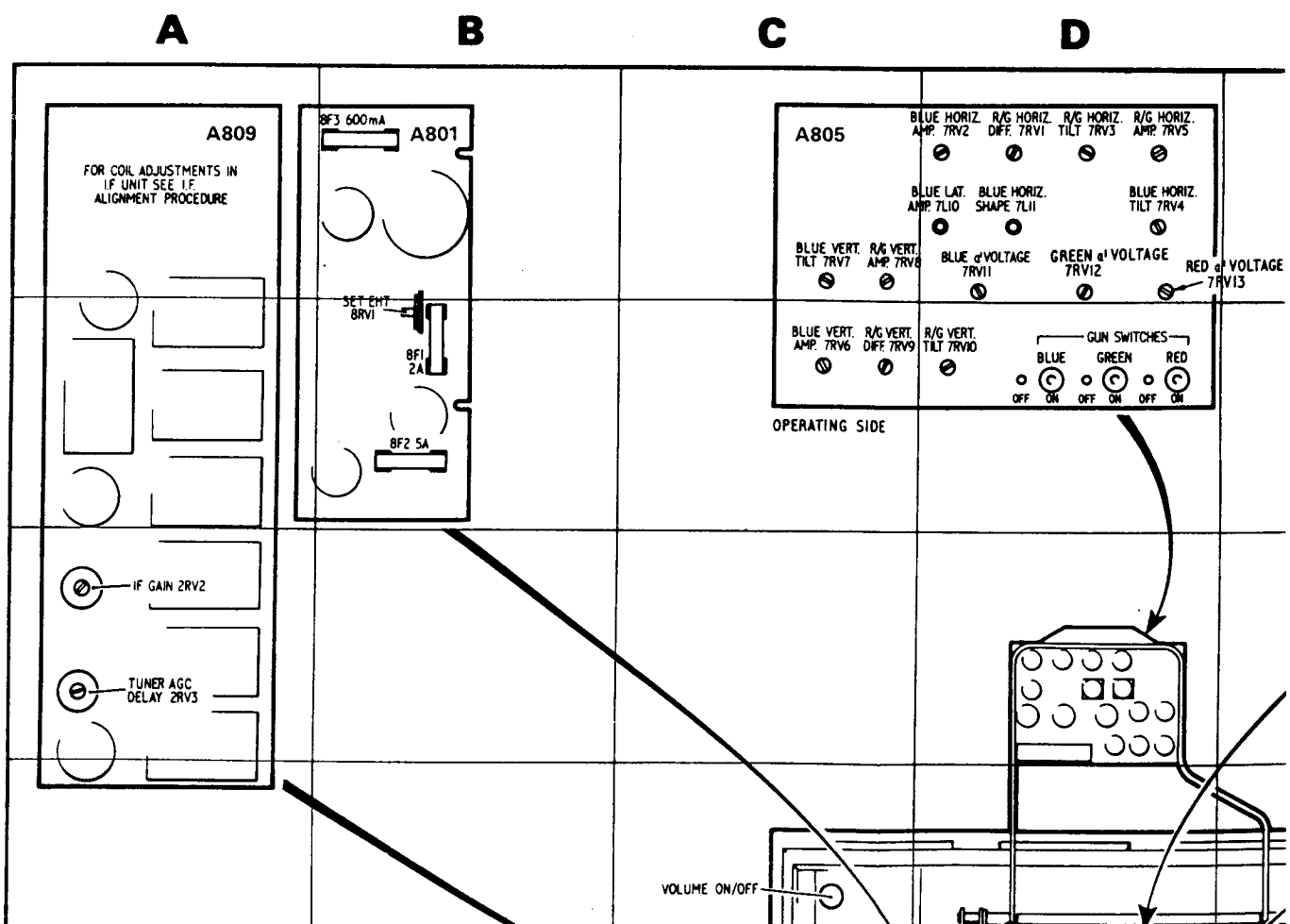


MISC.	C	R
	1	
X1 X2 X3	3a	4 1
	6 4 5	2
VT1		
L1	8	3
	3b	2
X4	7	
X5	3c 9	8 6
X6		5
L2 VT2 X7	10 11	
	3d	
L3	12 16	7
L4	14 15 17	9

CONVERGEN

MISC	RV5 RV4 RV13	VT1
R		
C	1 9	

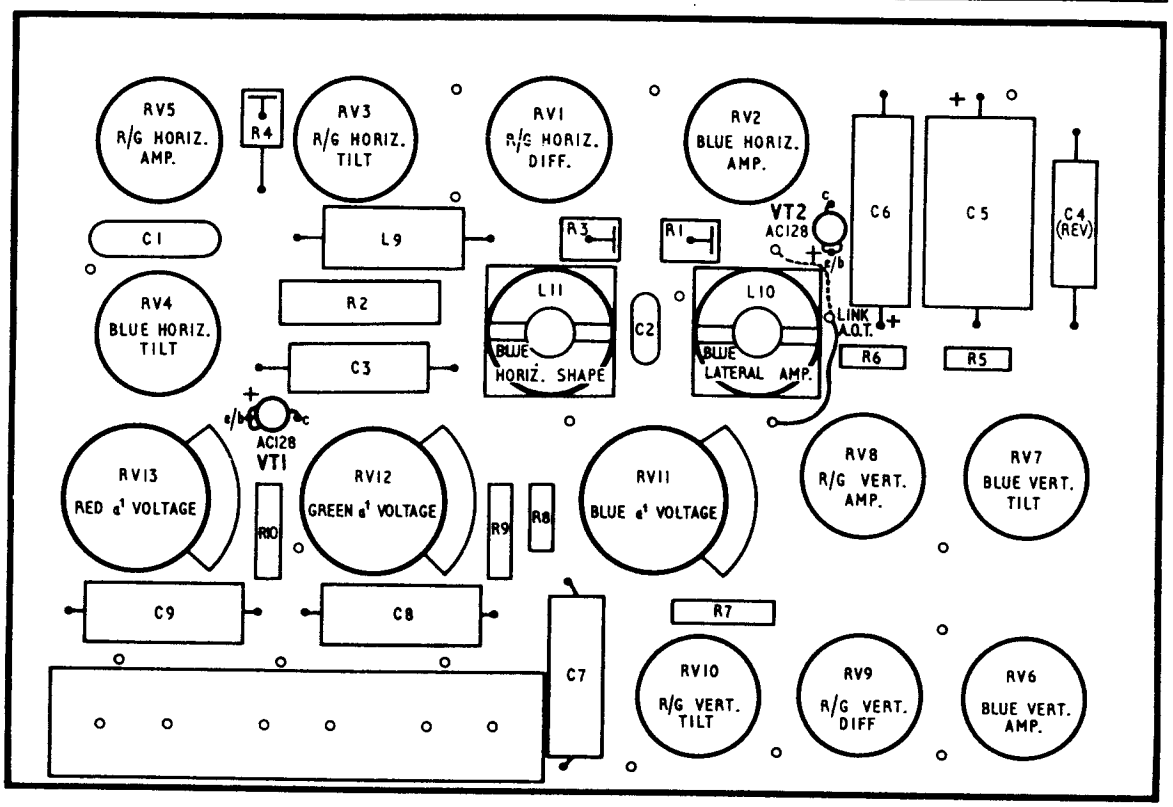




CONVERGENCE UNIT Type A805 (Component side)

C	R
1	
	4 1
4 2	
6 5	
	3
	2
7	
	8 6
9	
	5
11	
12 16	7
15 17	9

MISC	RV5 RV4 RV13	VT1	RV3 L9 RV12	RV1 L11	RV11	RV2 VT2 L10 RV10	RV8 RV9	RV7 RV6
R	4 10		2	9 8 3	1 7		6	5
C	1 9		3 8	7	2		6	5 4



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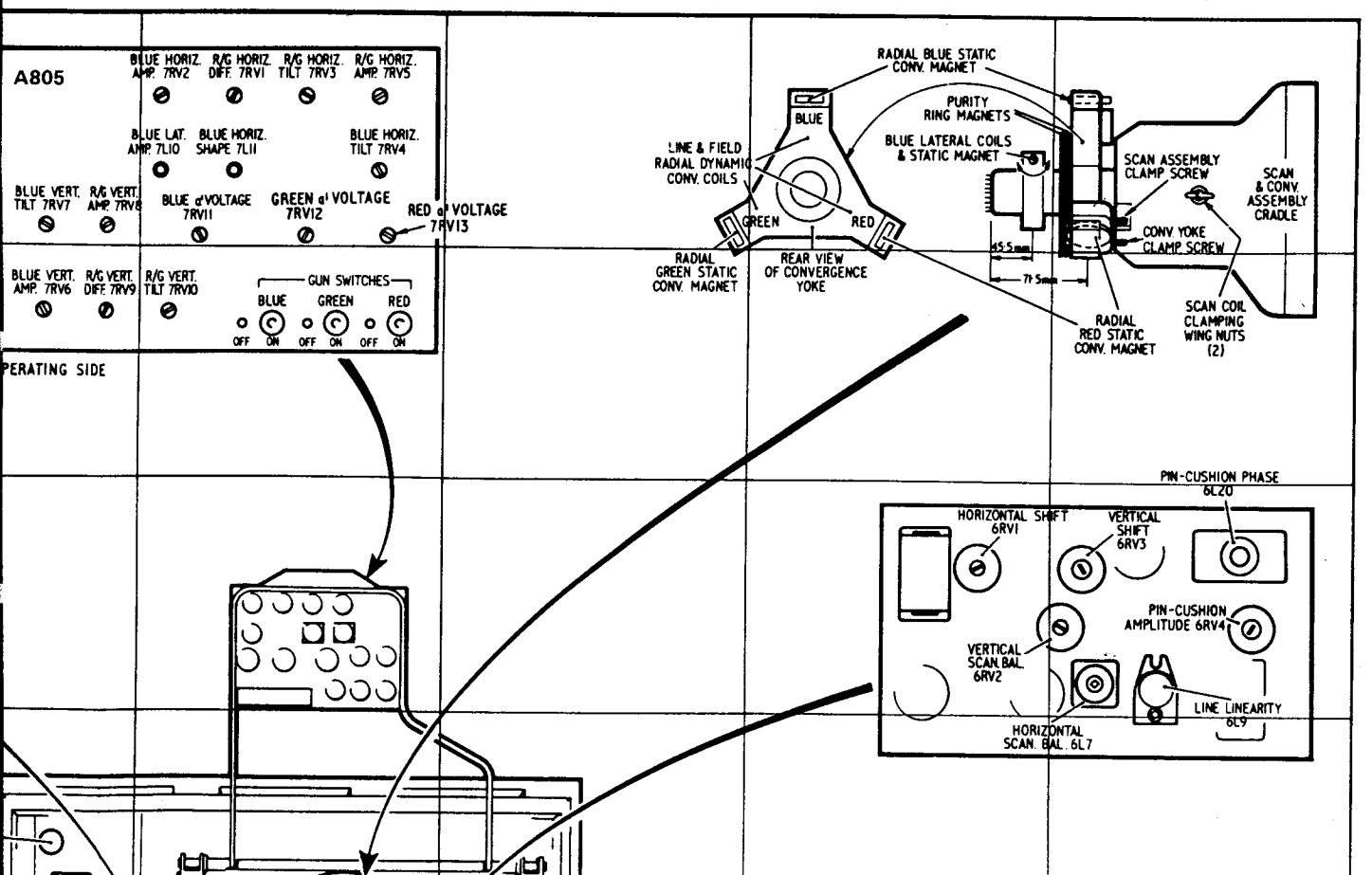
D E F G



SCAN CONTROL PANEL

| | | |

F2 5A

8Z1

MAINS INPUT

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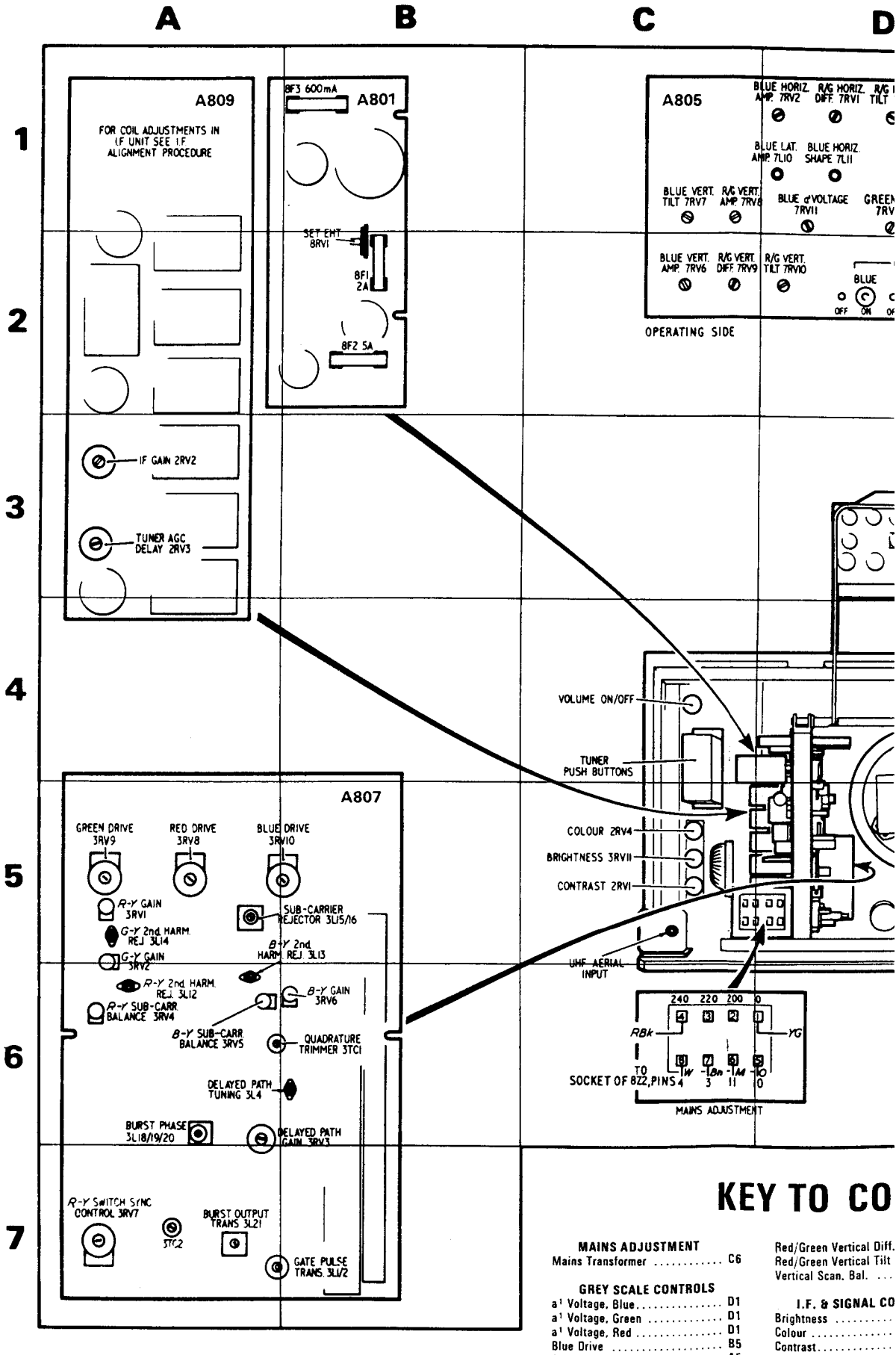


KEY TO CO

MAINS ADJUSTMENT

Mains Transformer C6

GREY SCALE CONTROLS

a¹ Voltage, Blue D1
a¹ Voltage, Green D1
a¹ Voltage, Red D1
Blue Drive B5
Green Drive A5
Red Drive A5
Gun Switches D2

CONVERGENCE CONTROLS

Blue Horizontal Amp. D1
Blue Horizontal Shape D1
Blue Horizontal Tilt D1
Blue Lateral Amp. D1
Blue Lateral Coils F1

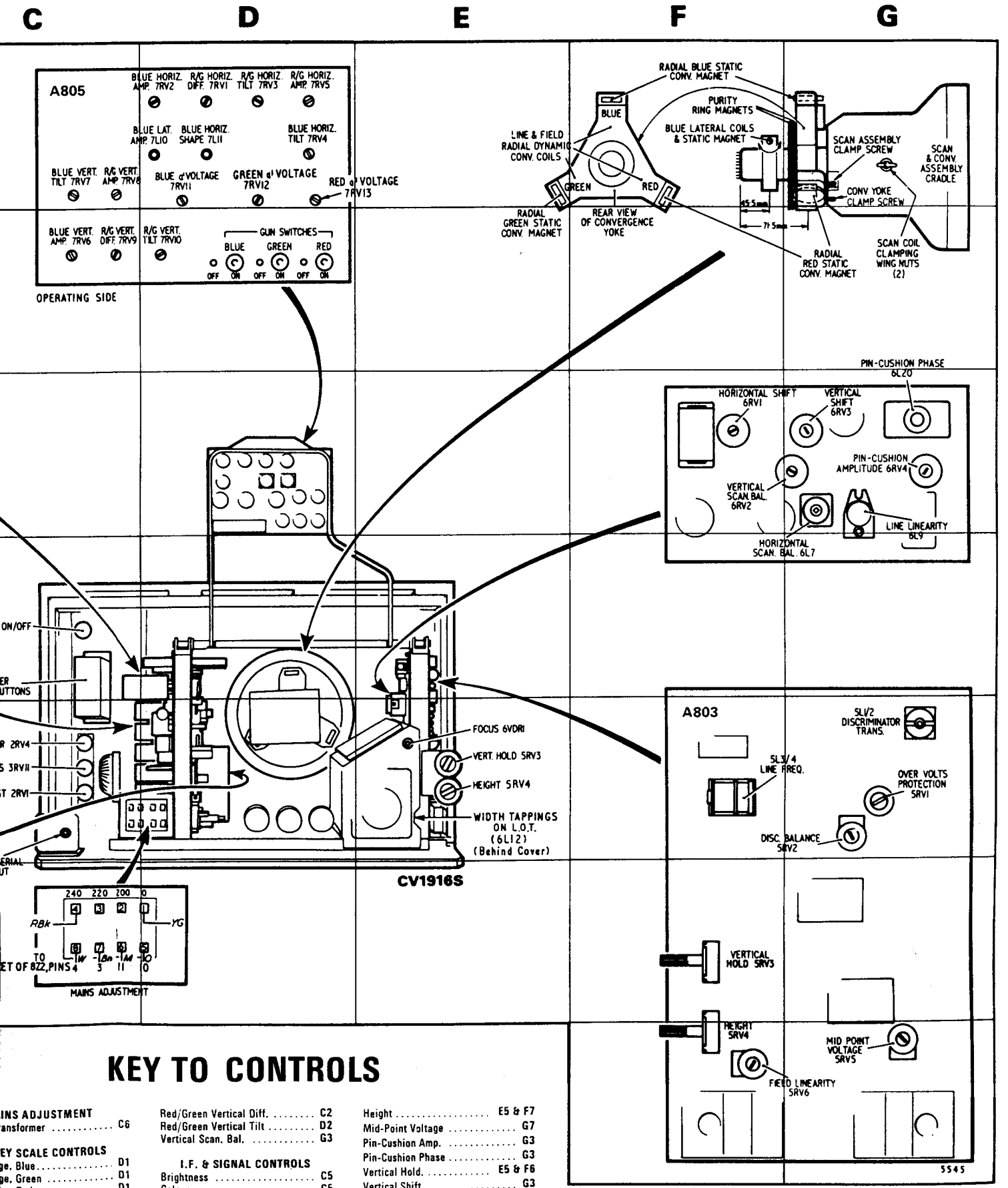
Red/Green Vertical Diff.
Red/Green Vertical Tilt
Vertical Scan. Bal. ...

I.F. & SIGNAL CO

Brightness .....
Colour .....
Contrast .....
I.F. Gain .....
Tuner A.G.C. Delay ...
Tuner Push Buttons ...
Volume On/Off .....

LINE TIMEBA
E.H.T. CONTR

Discriminator Balance .
Discriminator Transform
Focus .....



KEY TO CONTROLS

INS ADJUSTMENT
ransformer C6

EY SCALE CONTROLS
ge, Blue D1
ge, Green D1
ge, Red D1
re B5
ive A5
e A5
tches D2

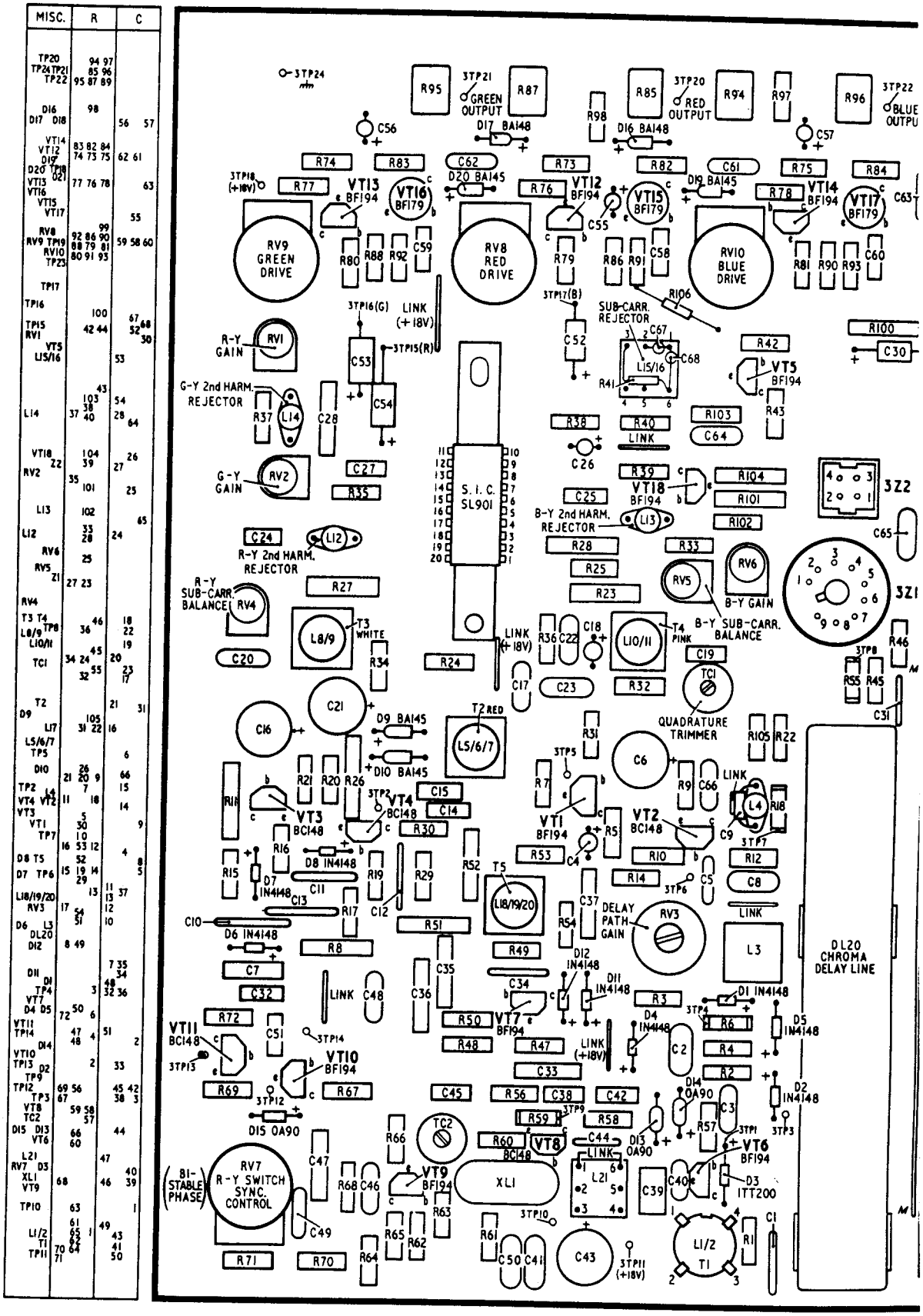
VERGENCE CONTROLS
izontal Amp. D1
izontal Shape D1
izontal Tilt D1
eral Amp. D1
eral Coils F1
tical Amp. C2
tical Tilt C1

Red/Green Vertical Diff. C2
Red/Green Vertical Tilt D2
Vertical Scan. Bal. G3

I.F. & SIGNAL CONTROLS
Brightness C5
Colour C5
Contrast C5
I.F. Gain A3
Tuner A.G.C. Delay A3
Tuner Push Buttons C4
Volume On/Off C4

LINE TIMEBASE & E.H.T. CONTROLS
Discriminator Balance G5
Discriminator Transformer G5
Focus E5
Horizontal Shift F3
Line Frequency F5
Height ..... E5 & F7
Mid-Point Voltage G7
Pin-Cushion Amp. G3
Pin-Cushion Phase G3
Vertical Hold. ..... E5 & F6
Vertical Shift. G3

DECODER CONTROLS
Burst Output Transformer A7
Burst Phase Transformer A6
Delayed Path Gain A6
Delayed Path Tuning B6
B-Y Gain B6
G-Y Gain A5
R-Y Gain A5
Gate Pulse Transformer A7
Quadrature Trimmer B6
B-Y 2nd Harmonic Rejector A6


MISC.
R
C
DECODER & R.G.B. DRIVE PANEL Type A807
RANK BUSH MURPHY

CIRCUIT DESCRIPTION

U.H.F. Tuner Type Z511

The Z511 is a four section transistorised u.h.f. tuner employing three r.f. transistors in a grounded base mode. Transistors 1VT1 and 1VT2 are used as an r.f. amplifier stage; this stage is followed by 1VT3 operating as a combined mixer and oscillator. An a.g.c. control voltage derived from the Z582 i.f. panel is applied to the base of IVT1. Four quarter wave coaxial lines 1X2, 4, 8 and 10 are employed as tuned elements for the aerial, r.f., mixer and oscillator respectively. Each of these lines is tuned by a varicap diode (1D1, 2, 3 and 4) with trimming and bandshaping of the r.f. and oscillator stages being carried out by coupling loops. The intermediate frequency signal developed across the output coil 1L10 is passed to the i.f. amplifier on the Z582 via 2Z1. By adjusting the customer push-button channel selector, the voltage applied to the varicap diodes is varied and hence the channel to which the unit is tuned.

A.F.C. and Power Supply Panel Z512

An i.f. signal from the Z582 is fed via 2Z5 to the base of transistor 1VT4 which acts, with 1L11 and 12, as a narrow band amplifier for 39·5 MHz. The output from this amplifier is fed to the base of 1VT5, the driver for the Foster-Seeley discriminator 1D5 and 6 etc. The output of the discriminator is zero at 39·5 MHz, but with decreasing frequency pin 6 of the Module ***AE*** goes positive and pin 7 goes negative. With increasing frequency these polarities are reversed. This resultant automatic frequency control correcting voltage is either added or subtracted, depending on its polarity, to the positive varicap control voltage set by the customer push-buttons, and appears at the wiper of 1RV2 to be fed to pin 4 of the Z511 where it is used to control the channel frequency of the tuner. The diodes 1D7 and 8 have been included to limit the a.f.c. correcting voltage to avoid an excessive pull-in range. The Hold-in Range control 1RV2 is adjusted to give a holding range of ±1 MHz at 39·5 MHz. A switch is provided on the customer push-button unit to mute the a.f.c. system whilst tuning.

The integrated circuit 1SIC1, TAA550 stabilises the voltage derived from the +200 V line of the Z584 decoder before feeding it to the varicap push-button control unit. Transistor 1VT6 provides a stabilised supply voltage and bias for the tuner. The base voltage of 1VT6 is held steady by the action of 1SIC1 whilst 1D9 provides compensation for changes of base current due to temperature variation.

ALIGNMENT PROCEDURE

1 Equipment Required

1. 1 External Bias Unit for Z582 . . . . . (See Fig. 19, Page C–16 of TP1741).
1. 2 Oscilloscope . . . . . Telequipment S43 or equivalent.
1. 3 Multi-range Meter . . . . . 20,000Ω per volt.
1. 4 Sweep Generator . . . . . providing swept i.f. signal 30 to 50MHz.
1. 5 Signal Generator, A.M./F.M. . . . . covering 30 to 50MHz, modulated 50% at 1000Hz, terminated.
1. 6 Signal Generator, U.H.F . . . . . covering 470 to 860MHz amplitude modulated.

2 Alignment of 1L10 in Z511

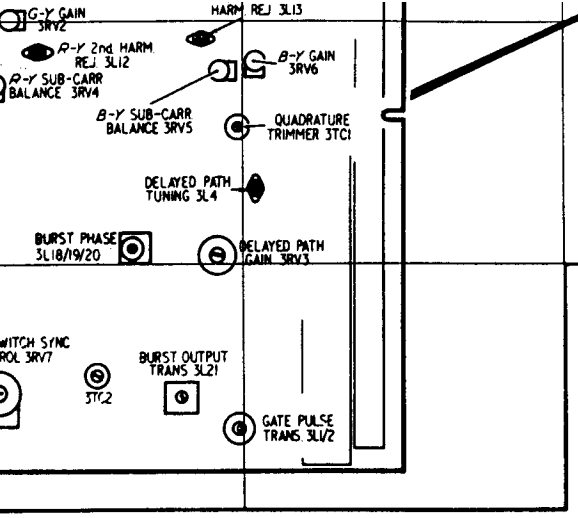
2. 1 Inject a swept i.f. signal into i.f. injection point at 1C29 on the side of the tuner Z511, monitor the output at 2TP8 on the Z582 I.F. Panel.
2. 2 Adjust 1L10 to position the vision carrier at 50% on the h.f. side of i.f. response (see Fig. 20, Page C-17 of TP1741).

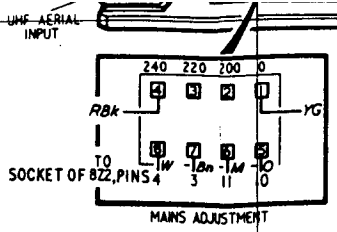
3 A.F.C. Bandpass Alignment

3. 1 Inject a 39·5MHz f.m. signal, modulated ±100kHz at 1000Hz, using an input level of 2mV, into 2Z5, 1 and 2
3. 2 Set the A.F.C. Switch, 1SW1 to the ON position and set the A.F.C. Hold-in Range control 1RV2 to its mid-position. Monitor the display at pin 6 of the F. M. Detector module ***(AE)*** on the oscilloscope.
3. 3 Set the core of 1L11 so that it is flush with the top of its former. Align 1L15, 14, 12, and 11 in that order, for maximum amplitude of display. The display will be a symmetrical sinewave with an amplitude of approx. 0·2V pk-p.k
3. 4 Change the signal generator from frequency to amplitude modulation and set the modulation depth to 50%. Adjust 1L15 only for minimum display amplitude. Revert to frequency modulation and re-check the display, then reduce the signal input level to check for any signs of instability. Disconnect signal generator and oscilloscope.

4 A.F.C. Hold-in Range Check

4. 1 Connect the external bias unit (See Item 1.1) to the i.f. unit at 2TP3, 4 and 5. Switch the A.F.C. Switch to the OFF position and set the R.F. Gain control 1RV3 fully anti-clockwise.
4. 2 Inject into the u.h.f. aerial socket, a signal of 600MHz, amplitude modulated 50% at 1000Hz at a level of not less than 1mV. Tune one of the unit push-buttons to this signal, monitoring the output at 2TP8 on the oscilloscope. Adjust the external bias unit to produce a display amplitude of 2V pk-pk.
4. 3 Check that the i.f. produced is 39·5MHz by injecting a 39·5MHz into 2TP1 on the Z582 via a 1pF capacitor and observing any beat pattern on the display.
4. 4 Change the input signal frequency to 599MHz. Set 1RV2 fully anti-clockwise and 1SW1 to ON. Rotate 1RV2 slowly clockwise to a point where the display regains its undistorted amplitude of 2V pk-pk.





(Behind Cover)

CV1916S

KEY TO CONTROLS

MAINS ADJUSTMENT
Mains Transformer C6

GREY SCALE CONTROLS
a¹ Voltage, Blue D1
a¹ Voltage, Green D1
a¹ Voltage, Red D1
Blue Drive B5
Green Drive A5
Red Drive A5
Gun Switches D2

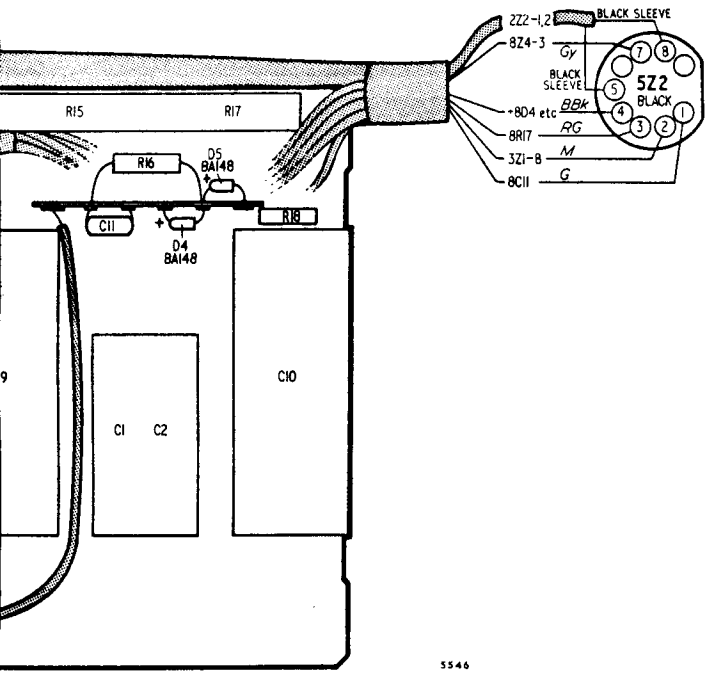
CONVERGENCE CONTROLS
Blue Horizontal Amp. D1
Blue Horizontal Shape D1
Blue Horizontal Tilt D1
Blue Lateral Amp. D1
Blue Lateral Coils F1
Blue Vertical Amp. C2
Blue Vertical Tilt C1
Horizontal Scan. Bal. G3
Purity Ring Magnets G1
Radial Static Conv. Magnets F1
Red/Green Horizontal Amp. D1
Red/Green Horizontal Diff. D1
Red/Green Horizontal Tilt D1
Red/Green Vertical Amp. C1
Red/Green Vertical Diff. C2
Red/Green Vertical Tilt D2
Vertical Scan. Bal. G3

I.F. & SIGNAL CONTROLS
Brightness C5
Colour C5
Contrast C5
I.F. Gain A3
Tuner A.G.C. Delay A3
Tuner Push Buttons C4
Volume On/Off C4

LINE TIMEBASE & E.H.T. CONTROLS
Discriminator Balance G5
Discriminator Transformer G5
Focus E5
Horizontal Shift F3
Line Frequency F5
Line Linearity G3
Over Volts Protection G5
Set E.H.T. B2
Width Tappings E5

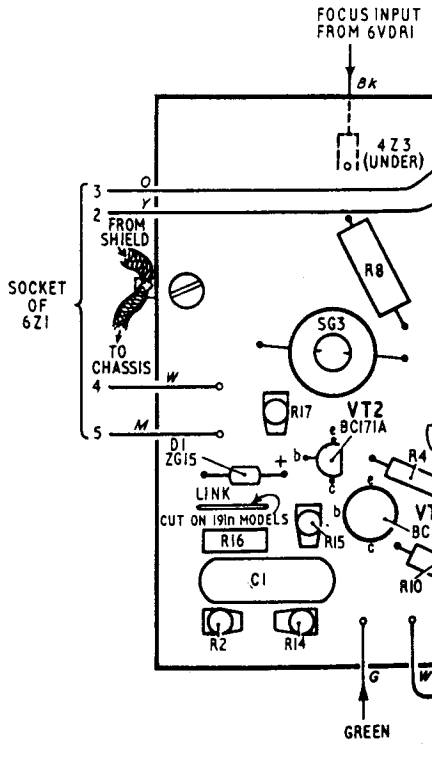
FIELD CONTROLS
Field Linearity F7
Height ..... E5 & F7
Mid-Point Voltage G7
Pin-Cushion Amp. G3
Pin-Cushion Phase G3
Vertical Hold ..... E5 & F6
Vertical Shift G3

DECODER CONTROLS
Burst Output Transformer A7
Burst Phase Transformer A6
Delayed Path Gain A6
Delayed Path Tuning B6
B-Y Gain B6
G-Y Gain A5
R-Y Gain A5
Gate Pulse Transformer A7
Quadrature Trimmer B6
B-Y 2nd Harmonic Rejector A6
G-Y 2nd Harmonic Rejector A5
R-Y 2nd Harmonic Rejector A6
B-Y Sub-Carrier Balance A6
R-Y Sub-Carrier Balance A6
Sub-Carrier Rejector A5
R-Y Switch Sync. Control A7
3TC2 ..... A7

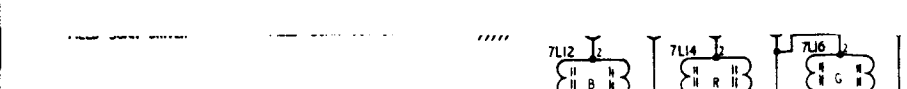


ABLEFORM

MISC.	R	C
Z3 D2	1 11	2
SG9 SGI	3 8 5	
ZI SG3	13	
VT2	17	
DI VI SG8 SG6	4	
VTI	16 15 9 6 7 10	1
SG7 SG2 SG5 SG4	2 14	



C.R.T. BASE PANEL



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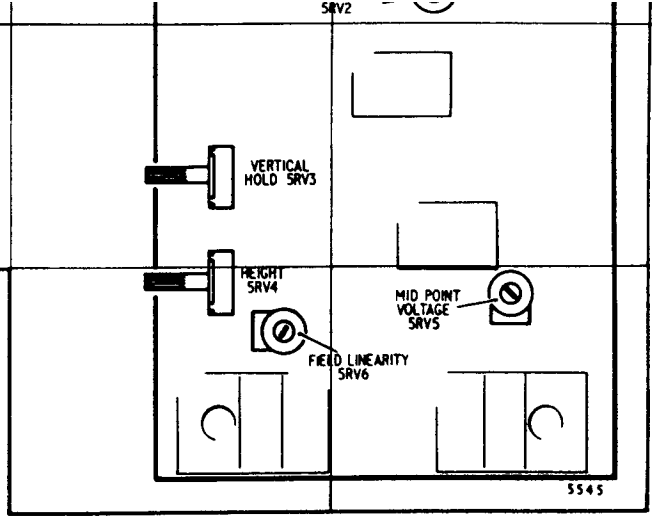
CV1916S



CONTROLS

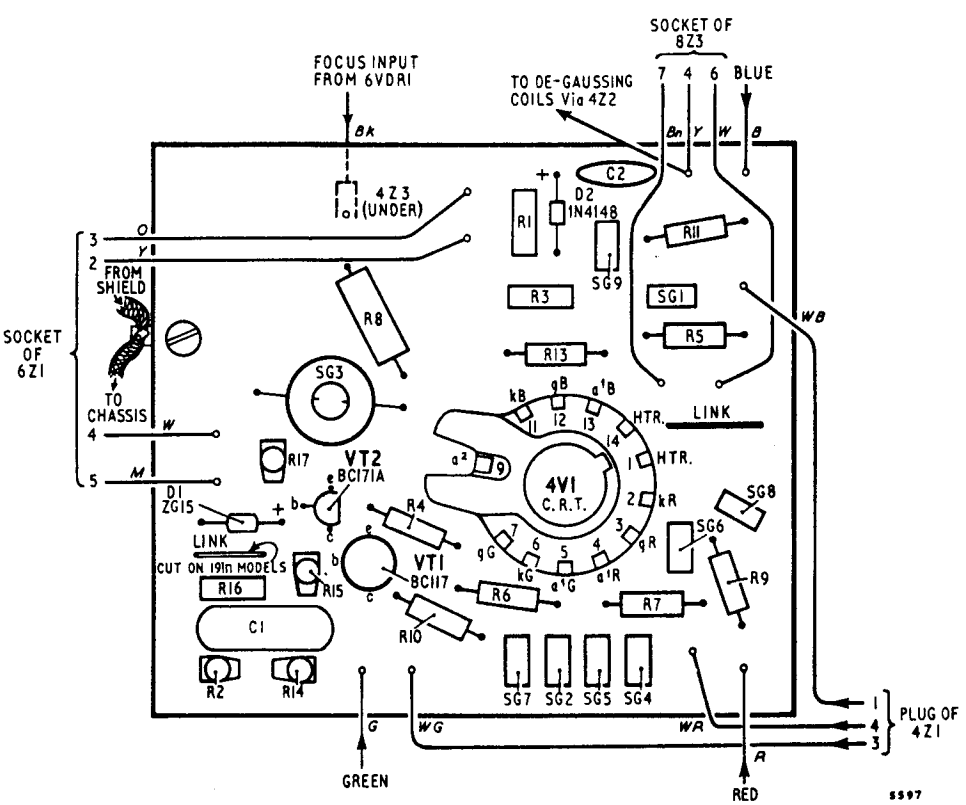
ertical Diff.	C2
ertical Tilt	D2
. Bal.	G3
IGNAL CONTROLS	
	C5
	C5
	C5
	A3
Delay	A3
uttons	C4
ff	C4
E TIMEBASE & .T. CONTROLS	
r Balance	G5
r Transformer	G5
	E5
nift	F3
ucy	F5
y	G3
rotection	G5
	B2
ngs	E5
LD CONTROLS	
ty	F7

Height	E5 & F7
Mid-Point Voltage	G7
Pin-Cushion Amp.	G3
Pin-Cushion Phase	G3
Vertical Hold.	E5 & F6
Vertical Shift	G3

DECODER CONTROLS

Burst Output Transformer	A7
Burst Phase Transformer	A6
Delayed Path Gain	A6
Delayed Path Tuning	B6
B-Y Gain	B6
G-Y Gain	A5
R-Y Gain	A5
Gate Pulse Transformer	A7
Quadrature Trimmer	B6
B-Y 2nd Harmonic Rejector	A6
G-Y 2nd Harmonic Rejector	A5
R-Y 2nd Harmonic Rejector	A6
B-Y Sub-Carrier Balance	A6
R-Y Sub-Carrier Balance	A6
Sub-Carrier Rejector	A5
R-Y Switch Sync. Control	A7
3TC2	A7

R	C
	2
1	11
3	
8	5
13	
17	
4	
16 15 6	9 7
10	1
2 14	

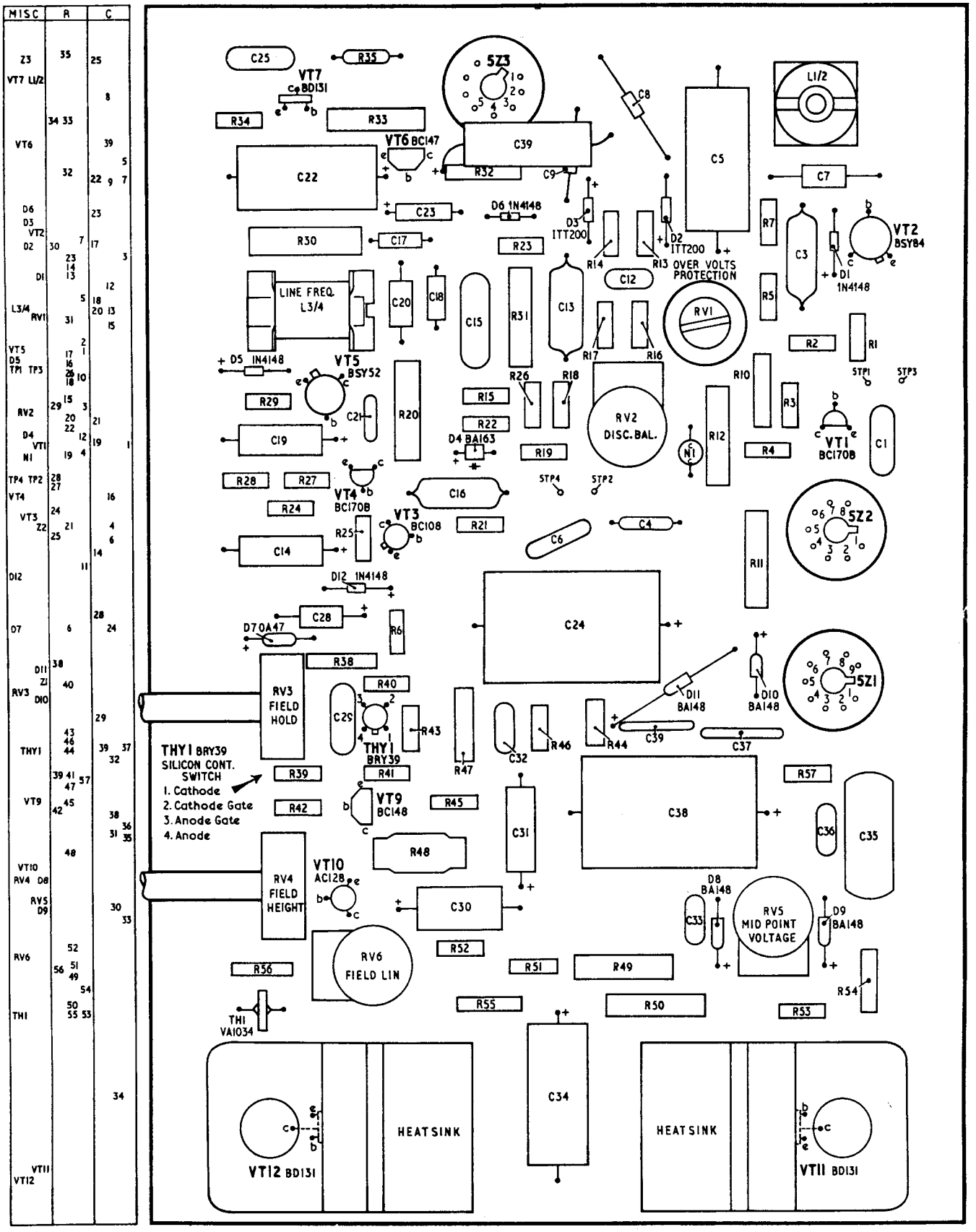


MISC	R	C
Z3	35	25
VT7 LI/2		8
	34 33	
VT6		39
	32	22 9 7
D6		23
D3 VT2		
D2	30 7	17
	23 14	3
DI	13	
		12
L3/4 RV1	5 31	18 20 13 15
VT5	17	2 1
D5 TM TP3	16 26 18	10
	29 15	3
RV2	20 22	21
D4 VT1	12 19	1
N1	19 4	
TP4 TP2	28 27	
VT4		16
VT3	24	
Z2	21 25	4 6
		14
DI2	11	
		28
D7	6	24
DII	38	
ZI	40	
RV3 DI0		
		29
	43 46	
THY1	44	39 37 32
	39 41 47	57
VT9	42 45	
	48	38 31 36 35
VTI0 RV4 D8		
RV5 D9		30 33
	52	
RV6	56 51 49	
	54	
THI	50 55 53	
		34
VTII VTI2		

THY1 8
SILICON SWI
1. Catho
2. Catho
3. Anod
4. Anod

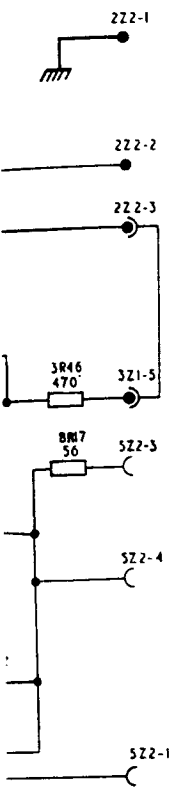
.T. BASE PANEL

SCAN DRIVE P



5550

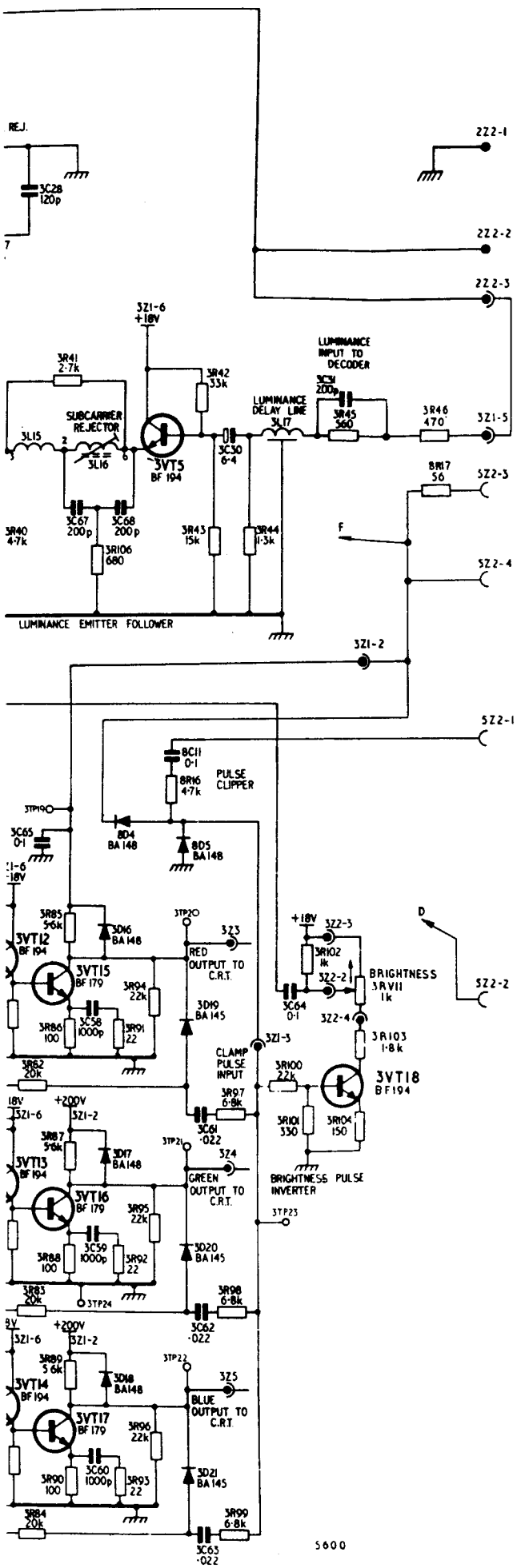
SCAN DRIVE PANEL Type A803



VOLTAGES

These voltages were obtained using a typical receiver under average signal conditions on a mains input of 240V a.c. A 20,000 ohms/volt meter was used with a suitable adaptor for measuring the E.H.T. and Focusing potential. All voltages are positive with respect to chassis unless otherwise stated. N.T. indicates no test.

Ref.	Type	Electrode Voltage			Remarks
		emitter	base	collector	
1VT1	BF180	N.T.	N.T.	N.T.	
1VT2	BF171	N.T.	N.T.	N.T.	
2VT1	BF196	3·3	4·0	7·3	
2VT2	BF194	11·0	11·5	18·0	
2VT3	BF197	3·9	4·5	10·0	
2VT4	BF197	8·1	7·0	15·0	
2VT5	BC148	4·0	4·5	15·5	Depends on setting of 2RV2
2VT6	BC158	19·0	18·5	7·5	Depends on setting of 2RV3
2VT7	BC148	3·6	2·5	8·0	
2VT8	BC196	7·0	8·0	15·0	
2VT9	BF197	2·5	3·2	16·5	
2VT10	BC148	1·0	1·6	6·5	
2VT11	BC148	6·0	6·5	17·0	
2VT12	BC153	1·2	3·0	12·2	
2VT13	BC113	0·7	1·2	12·5	
2VT14	BC107	—	0·7	12·5	
2VT15	AC176	12·6	13·0	25·0	
2VT16	AC128	12·6	12·5	—	
3VT1	BF194	—	0·5	0·1	
3VT2	BC148	1·9	2·1	17·0	Depends on setting of 3RV3
3VT3	BC148	—	0·5	6·0	Colour on
		—	0	12·0	Colour off
3VT4	BC148	—	0·5	6·0	Colour on
		—	0·8	0·5	Colour off
3VT5	BF194	5·1	5·6	18·0	
3VT6	BF194	2·2	3·0	18·0	
3VT7	BF194	0	−3·6	−2·1	
3VT8	BC148	0	0	18·0	
3VT9	BF194	0·6	0·9	10·0	Colour on
		1·5	2·1	10·0	Colour off
3VT10	BF194	2·8	3·0	18·0	
3VT11	BC158	18·0	17·2	17·3	Colour on
		18·0	17·4	0·6	Colour off
3VT12	BF194	2·0	2·5	18·0	Bright. max.
		1·4	2·0	18·0	Bright. min.
3VT13	BF194	2·0	2·5	18·0	Bright. max.
		1·4	2·0	18·0	Bright. min.
3VT14	BF194	2·0	2·5	18·0	Bright. max.
		1·4	2·0	18·0	Bright. min.
3VT15	BF179	1·5	2·0	100	Bright. max.
		0·8	1·7	125	Bright. min.
3VT16	BF179	1·5	2·0	100	Bright. max.
		0·8	1·7	125	Bright. min.
3VT17	BF179	1·5	2·0	100	Bright. max.
3VT17	BF179	0·8	1·7	125	Bright. min.
3VT18	BF194	0·25	0·3	16·0	
8VT1	BC147	−0·2	−1·5	10·0	
		Cathode	Anode	Gate	
8THY1	BT106	N.T.	N.T.	N.T.	

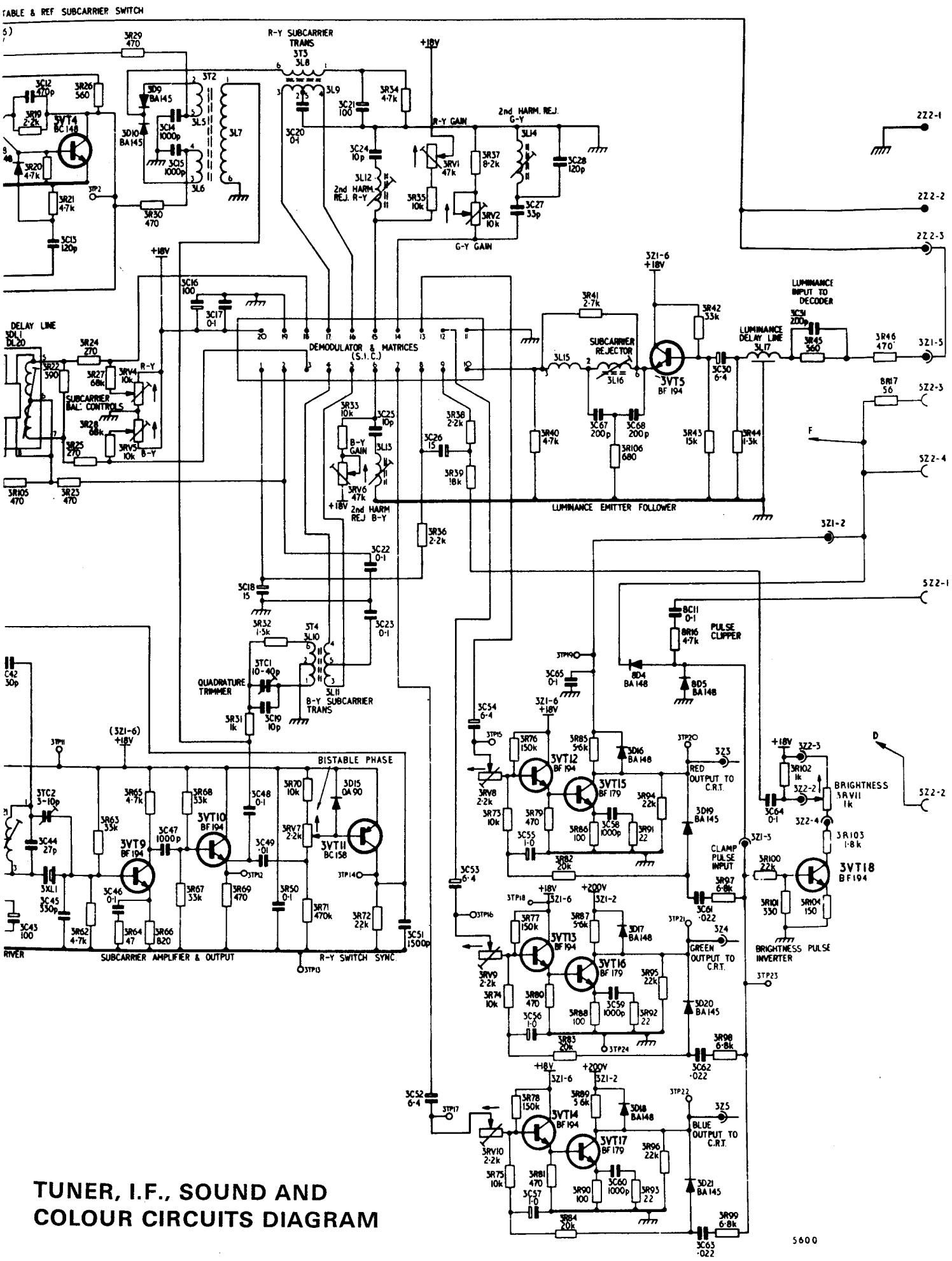


AMPLIFIERS & CLAMPS

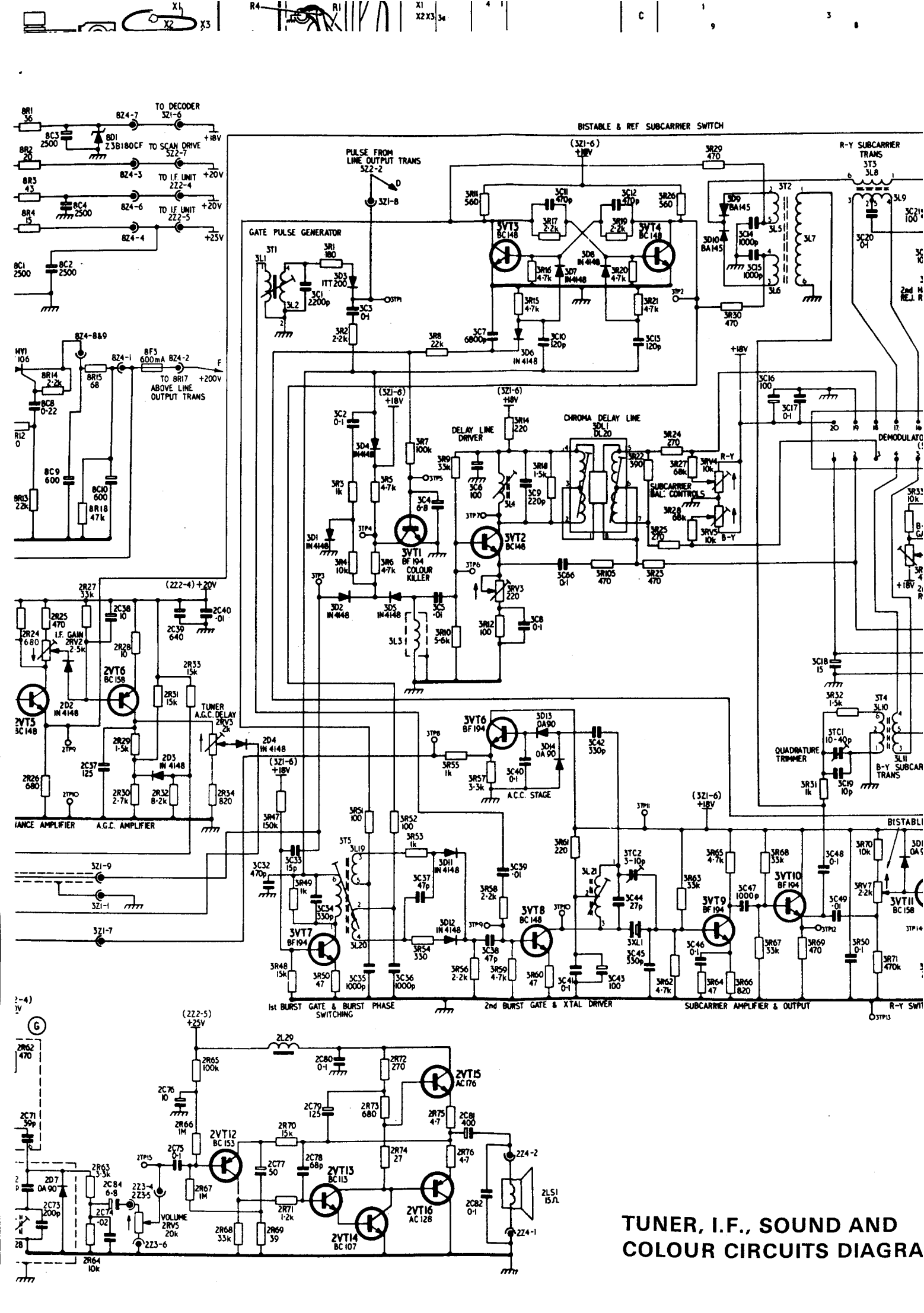
VOLTAGES

These voltages were obtained using a typical receiver unde
ditions on a mains input of 240V a.c. A 20,000 ohms/volt n
suitable adaptor for measuring the E.H.T. and Focusing p
are positive with respect to chassis unless otherwise stated.

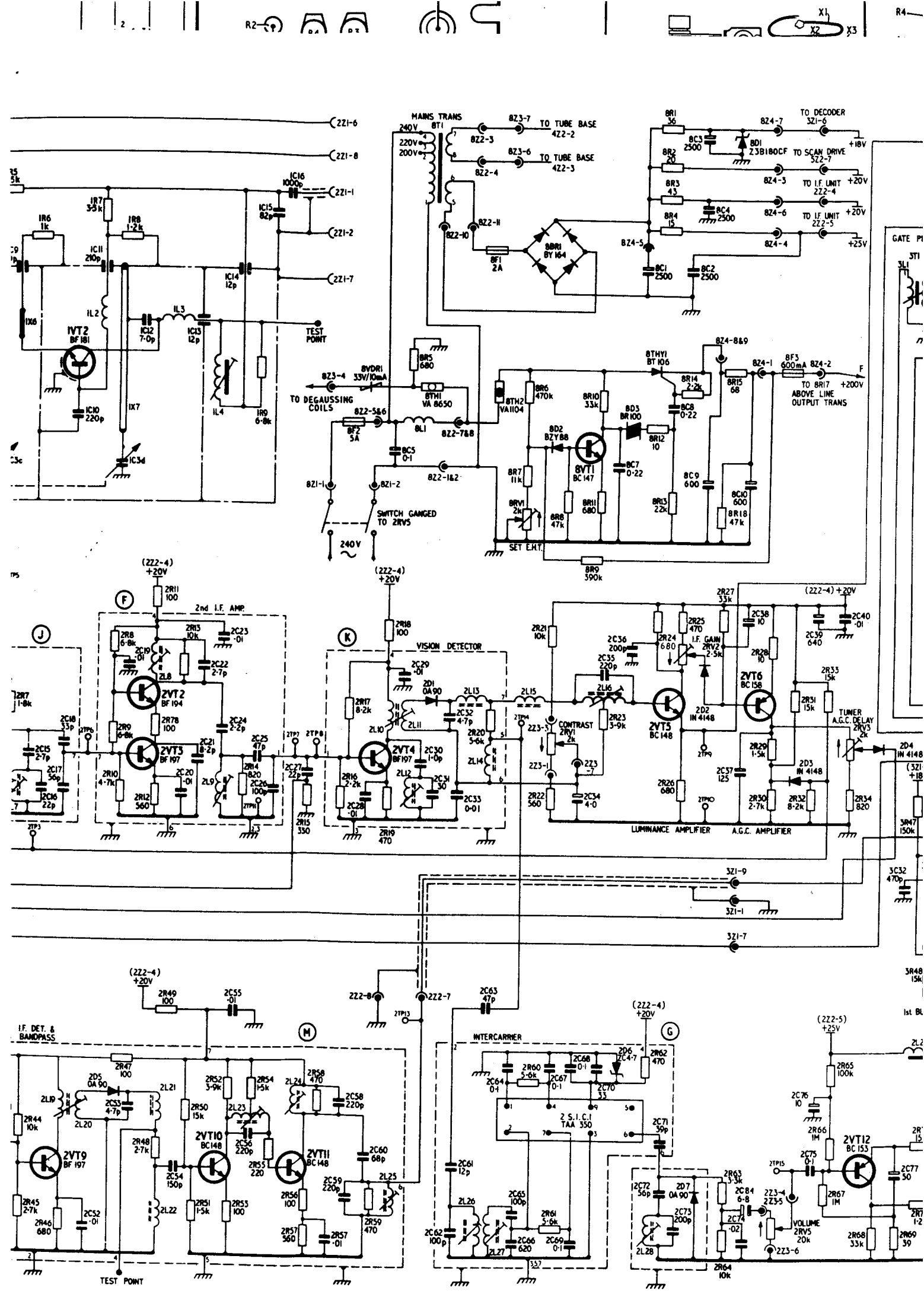
Ref.	Type	Electrode Voltage			Remark
		emitter	base	collector	
1VT1	BF180	N.T.	N.T.	N.T.	
1VT2	BF171	N.T.	N.T.	N.T.	
2VT1	BF196	3·3	4·0	7·3	
2VT2	BF194	11·0	11·5	18·0	
2VT3	BF197	3·9	4·5	10·0	
2VT4	BF197	8·1	7·0	15·0	
2VT5	BC148	4·0	4·5	15·5	Depend
2VT6	BC158	19·0	18·5	7·5	Depend
2VT7	BC148	3·6	2·5	8·0	
2VT8	BC196	7·0	8·0	15·0	
2VT9	BF197	2·5	3·2	16·5	
2VT10	BC148	1·0	1·6	6·5	
2VT11	BC148	6·0	6·5	17·0	
2VT12	BC153	1·2	3·0	12·2	
2VT13	BC113	0·7	1·2	12·5	
2VT14	BC107	—	0·7	12·5	
2VT15	AC176	12·6	13·0	25·0	
2VT16	AC128	12·6	12·5	—	
3VT1	BF194	—	0·5	0·1	
3VT2	BC148	1·9	2·1	17·0	Depend
3VT3	BC148	—	0·5	6·0	Colour
		—	0	12·0	Colour
3VT4	BC148	—	0·5	6·0	Colour
		—	0·8	0·5	Colour
3VT5	BF194	5·1	5·6	18·0	
3VT6	BF194	2·2	3·0	18·0	
3VT7	BF194	0	−3·6	−2·1	
3VT8	BC148	0	0	18·0	
3VT9	BF194	0·6	0·9	10·0	Colour
		1·5	2·1	10·0	Colour
3VT10	BF194	2·8	3·0	18·0	
3VT11	BC158	18·0	17·2	17·3	Colour
		18·0	17·4	0·6	Colour
3VT12	BF194	2·0	2·5	18·0	Bright.
		1·4	2·0	18·0	Bright.
3VT13	BF194	2·0	2·5	18·0	Bright.
		1·4	2·0	18·0	Bright.
3VT14	BF194	2·0	2·5	18·0	Bright.
		1·4	2·0	18·0	Bright.
3VT15	BF179	1·5	2·0	100	Bright.
		0·8	1·7	125	Bright.
3VT16	BF179	1·5	2·0	100	Bright.
		0·8	1·7	125	Bright.
3VT17	BF179	1·5	2·0	100	Bright.
3VT17	BF179	0·8	1·7	125	Bright.
3VT18	BF194	0·25	0·3	16·0	
8VT1	BC147	−0·2	−1·5	10·0	
		Cathode	**Anode**	**Gate**	
8THY1	BT106	N.T.	N.T.	N.T.	



TUNER, I.F., SOUND AND COLOUR CIRCUITS DIAGRAM



TUNER, I.F., SOUND AND COLOUR CIRCUITS DIAGRA


MAINS TRANS
BT1
240V
220V
200V
TO TUBE BASE
TO DECODER
TO SCAN DRIVE
TO I.F. UNIT
TO I.F. UNIT
TO DEGAUSSING COILS
SWITCH GANGED TO 2RV5
240V
SET E.H.T.
TO 8RI7 ABOVE LINE OUTPUT TRANS
TEST POINT
2nd I.F. AMP.
VISION DETECTOR
CONTRAST
I.F. GAIN
TUNER A.G.C. DELAY
LUMINANCE AMPLIFIER
A.G.C. AMPLIFIER
I.F. DET. & BANDPASS
INTERCARRIER
2 S.I.C.I TAA 350
VOLUME
TEST POINT

5 Stabilising Voltage Check

5. 1 Check that 1S1C1 (TAA550) is stabilising the voltage at 1Z3 pin 8 at 33V, ±1V. Check that the supply to pin 3 of the Z511 is 12V, ±1V.

6 Tuning Range

6. 1 With the u.h.f. signal generator connected to the tuner aerial socket, and the A.F.C. Switch 1SW1 in the OFF position, check that the frequency coverage of the tuner is at least 470·75MHz to 853·75MHz. The signal should be amplitude modulated 50% at 1000Hz and the output monitored on the Z582 at 2TP8, with the oscilloscope. After completing this check disconnect the signal generator and oscilloscope.

7 R.F. Gain Control, 1RV3, Setting

7. 1 With no signal input applied, monitor the voltage at Pin 1 of the tuner unit Z511 with the meter, Item 1. 3, set to its 10V range. Adjust 1RV3 to produce 2·8V at this point.

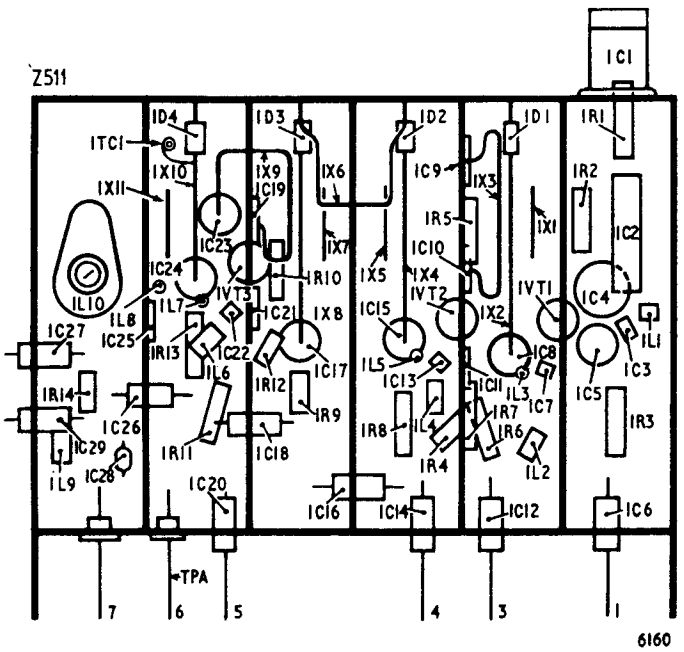


Fig. 1 Component Layout, Tuner type Z511

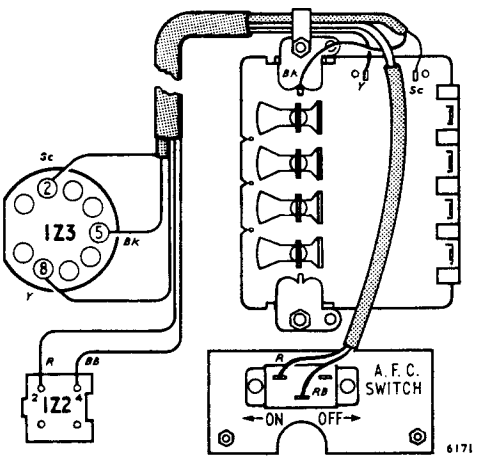


Fig. 2 Customer Control Unit Interconnection Diagram

ADJUSTMENT PROCEDURE

The adjustment procedure for the Z584 decoder is identical to that for the Z180 decoder, as printed TP1741 Service Information, apart from Sections 23 to 26, Identity Control (Final Adjustment). These adjustments should be now made as follows:

1 Reference Levels

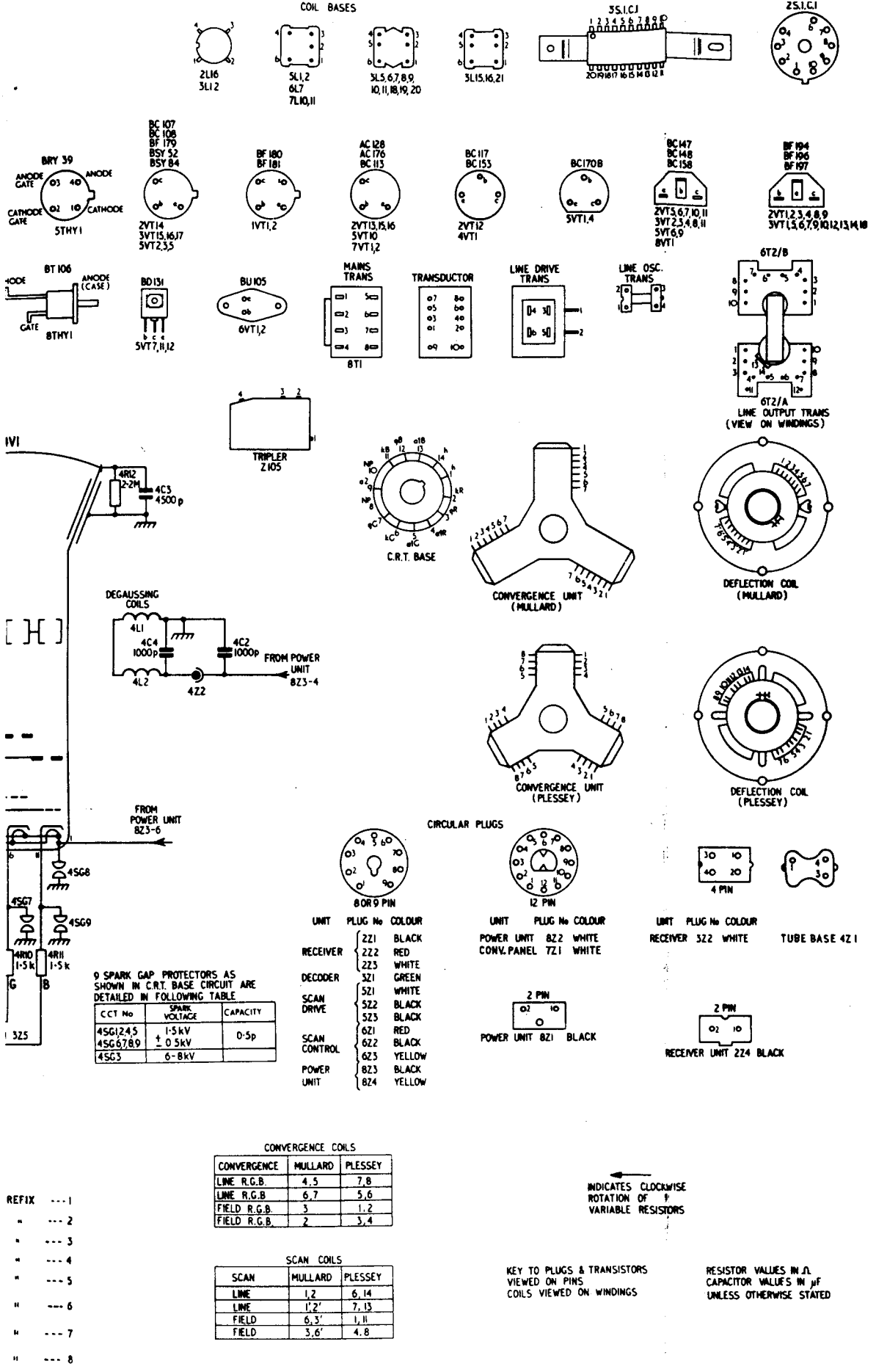
1. 1 Inject a colour bar signal at the aerial socket and monitor the output on the oscilloscope at 3TP7. Adjust the Pre-set Colour control 2RV6 on the Z582 panel to provide 600mV, pk-pk of U reference output at 3TP7.
1. 2 Transfer the oscilloscope to 3TP1 and adjust the Burst Gain control 3RV2 for 450mV pk-pk of the red colour bar at 3TP1.
1. 3 Recheck operations 1. 1 and 1. 2 above to achieve the figures quoted.

2 Identity Adjustment

2. 1 Connect a 10kΩ resistor (preferably ±1% tolerance) between 3TP8 and the wiper of the Identity control 3RV4. Turn the Identity control 3RV4 fully clockwise.
2. 2 De-couple the bi-stable trigger pulse momentarily by connecting a 10μF capacitor between the link to pin 5 of the SL917A and chassis (3TP4) and then removing it, until the circuit goes into the 'reverse ident' condition (low saturation, reverse phase colours).
2. 3 Rotate the Identity control slowly anti-clockwise until correct ident *just* occurs.
2. 4 Interrupt the bi-stable trigger pulse 15 to 20 times (See 2. 2 above) to ensure that reverse ident does not occur after interruption of pulse. If it does, rotate 3RV4 a *few* degrees further anti-clockwise, and repeat.

3 Colour Killer Check

3. 1 Remove the 10kΩ resistor and insert a 27kΩ ±1% resistor between 3TP8 and chassis (3TP4).
3. 2 Change channels by depressing a tuner push-button and ensure that the display does not 'colour kill', if it does repeat section 2 above.



Ref.	Type
4VT1	BC117
4VT2	BC171
5VT1	BC170B
5VT2	BSY84
5VT3	BC108
5VT4	BC170B
5VT6	BC147
5VT7	BD131
5VT8	
5VT9	BC148
5VT10	AC128
5VT11	BD131
5VT12	BD131
6VT1	BU105
6VT2	BU105
7VT1	AC128
7VT2	AC128
5THY1	BRY39

Ref.	Pin No.
4V1	
	1
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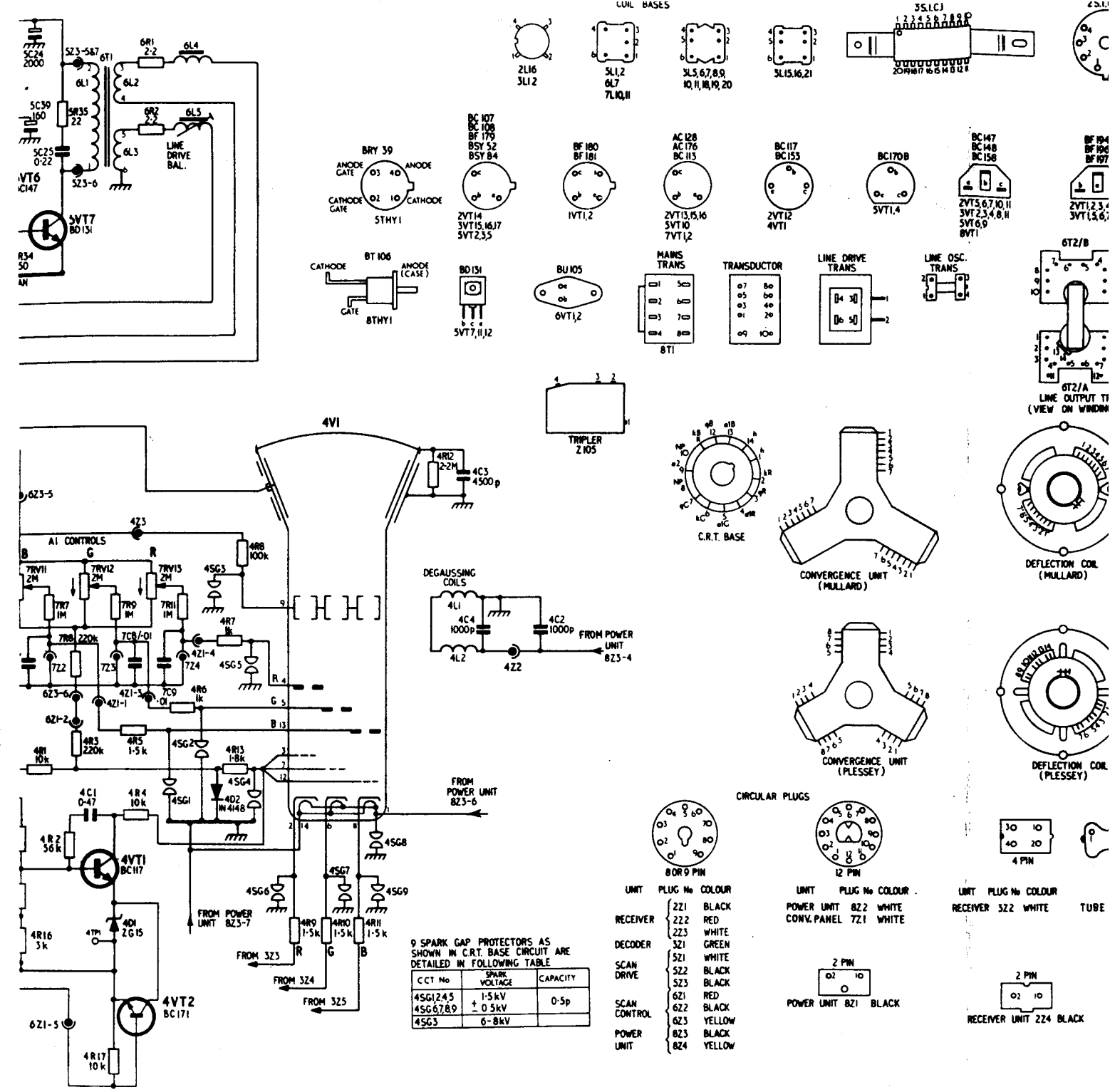
TIMEBASE, E.H.T. & CONVERGENCE CIRCUITS DIAGRAM



COMPONENT PREFIXES

A770	U.H.F. TUNER UNIT	COMPONENT PREFIX ---1
A809	I.F. AND SOUND UNIT	" " ---2
A807	DECODER & R G B DRIVES	" " ---3
	TUBE BASE PANEL	" " ---4
	SCAN DRIVE PANEL	" " ---5
A802	LINE SCAN, EHT UNIT, & SCAN CONTROL	" " ---6
A805	CONVERGENCE PANEL	" " ---7
A801	POWER SUPPLY PANEL ETC.	" " ---8

CONVERGENCE COILS

CONVERGENCE	MULLARD	PLESSEY
LINE R.G.B.	4,5	7,8
LINE R.G.B	6,7	5,6
FIELD R.G.B.	3	1,2
FIELD R.G.B.	2	3,4

SCAN COILS

SCAN	MULLARD	PLESSEY
LINE	1,2	6,14
LINE	1',2'	7,13
FIELD	6,3'	1,11
FIELD	3,6'	4,8

INDICATES CLOCKWISE ROTATION OF VARIABLE RESISTORS

KEY TO PLUGS & TRANSISTORS VIEWED ON PINS
COILS VIEWED ON WINDINGS

RESISTOR VALUES IN Ω
CAPACITOR VALUES IN
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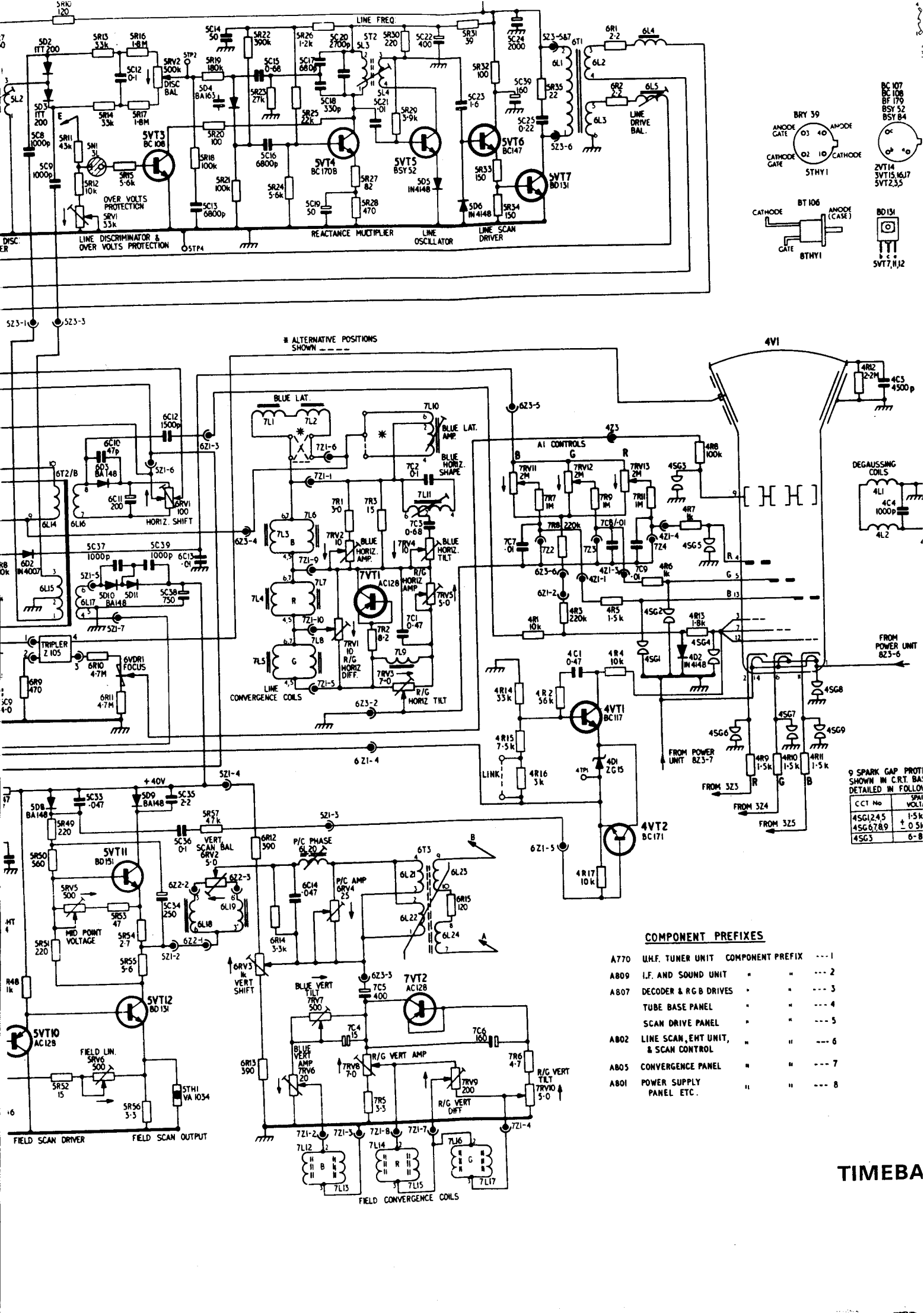
TIMEBASE, E.H.T. & CONVERGENCE CIRCUITS DIAGRA



9 SPARK GAP PROTI SHOWN IN C.R.T. BAS DETAILED IN FOLLO

CCT No	SPAI VOLTS
4SG1,2,4,5	1·5k
4SG6,7,8,9	± 0·5k
4SG3	6-8

COMPONENT PREFIXES

A770	U.H.F. TUNER UNIT	COMPONENT PREFIX	--- 1
A809	I.F. AND SOUND UNIT	" "	--- 2
A807	DECODER & R G B DRIVES	" "	--- 3
	TUBE BASE PANEL	" "	--- 4
	SCAN DRIVE PANEL	" "	--- 5
A802	LINE SCAN, EHT UNIT, & SCAN CONTROL	" "	--- 6
A805	CONVERGENCE PANEL	" "	--- 7
A801	POWER SUPPLY PANEL ETC.	" "	--- 8

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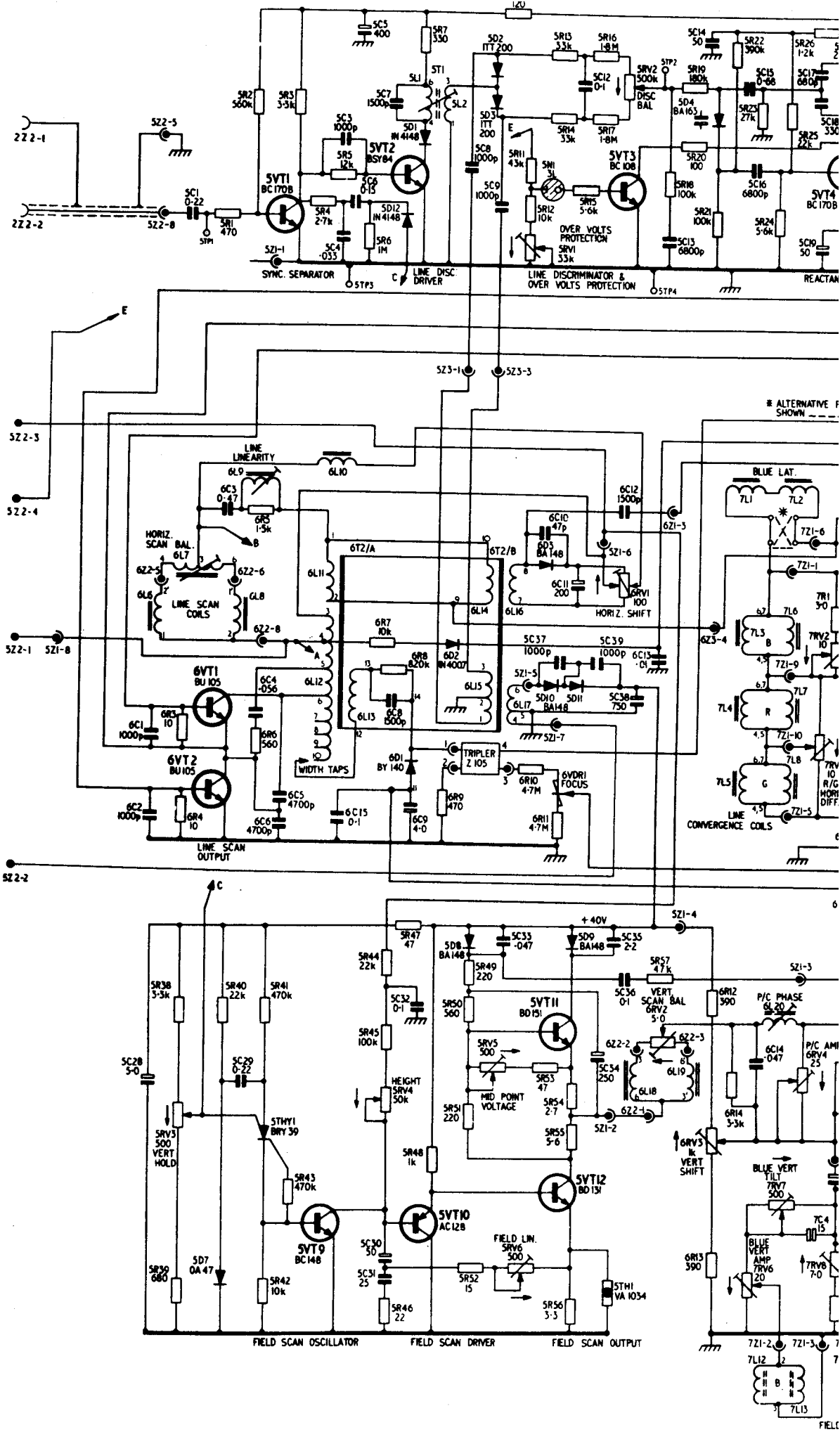

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BUSH MURPHY

SERVICE INFORMATION

MODELS CTV182S, CTV184S, CT187CS, CV1916S, CV2211S, CT2516CS

Single Standard Colour Television Receivers

This range of television receivers is fully transistorised and the transistors which are employed are robust and reliable under normal operating conditions. However, it is necessary to stress the need to apply the precautions usual when servicing a transistorised receiver i.e. avoiding short-circuits by crocodile clips, leakage currents and/or overheating from a soldering iron particularly in the time-base section of the instrument.

INSTALLATION

NOTE :–The adjustment of the picture controls, i.e. Height, Hold, etc. follows standard practice.

1. **Mains Adjustment.** The receiver as supplied is suitable for a 240 volts a.c. supply. If the receiver is modified for operation on voltages other than 240 volts a.c. this must be noted on the rear of the cabinet back.

2. **Degaussing.** Automatic degaussing is fitted which will normally take care of any magnetic effects induced into the screen. Use an external degaussing coil if required.

3. **Push Button Selection.** To tune, press in the appropriate button and allow it to return to its normal operating position. Withdraw the button slightly and turn it until the receiver is correctly tuned to the desired channel.
NOTE :–Clockwise rotation of a button selects channels in a descending order of frequency.

4. **Tuner AGC Delay Control.** This control should not be adjusted but if its setting has been inadvertently disturbed, however, the slider of the control should be rotated fully clockwise and left in this position.

5. **Purity.** If necessary, adjust the Purity Ring magnets for satisfactorily pure fields on each gun.

6. **Convergence.** Refer to diagram on convergence panel.

MAINTENANCE ADJUSTMENTS

This information is included to enable the correct adjustment of the undermentioned controls to be made in the event of any of these controls being accidentally disturbed.

1. Pre-set I.F. Gain

1. Set the Brightness and Contrast Controls to a midway position.
2. Adjust the Pre-set I.F. Gain control 2RV2 (see I.F. Unit diagram) for a correctly contrasted picture.
3. To check, turn the Contrast control fully clockwise and then operate the channel push buttons. If the contrast level is incorrect resulting in over-loading reduce slightly the setting of the pre-set I.F. Gain control. Re-adjust Brightness and Contrast controls to normal operating positions.

2. Grey Scale

1. Switch on, with no signal input.
2. Remove tuner socket 2Z1 from the i.f. unit to obtain a noise-free raster.
3. Set the R. G. & B. drive controls 3RV8, 3RV9, 3RV10 (see Decoder panel diagram) to maximum, the A1 controls 7RV11 7RV12, 7RV13 (see Convergence Panel diagram) to minimum and the Brightness control to maximum.
4. Adjust the A1 controls in this order (leave all gun switches ON).
   (a) the Green A1 control 7RV12, to a just visible green raster.
   (b) the Red A1 control 7RV13 until red is just introduced into the raster.
   (c) the Blue A1 control 7RV11 until blue is just introduced into the raster.
5. Restore the tuner socket and the signal, adjust the Contrast control to a normal picture and set the Brightness control for the correct black level.
6. Adjust the appropriate A1 control to remove colouration if any, in the lowlights close to black level.
7. Adjust, if necessary, the appropriate drive control for no colouration in the peak white areas (Illuminant D).
8. Check that the overall grey scale is satisfactory.

3. Focus

The Focus control 6VDR1 is adjusted, using an insulated screwdriver, through a hole in the e.h.t. compartment cover. (see Controls Diagram).

4. Set E.H.T.

This control is set for an e.h.t. of 25kV measured under signal conditions with zero brightness on the c.r.t. screen using a high voltage meter whose impedance is not less than 30M ohms.

5. E.H.T. over-volts protection control

This control should not be disturbed from its setting, as indicated by the paint spot, without reference to the recommended procedure.

THE SERVICE DEPARTMENT

RANK BUSH MURPHY

A DIVISION OF THE RANK ORGANISATION

DRAYTON ROAD · BOREHAM WOOD · HERTFORDSHIRE · ENGLAND

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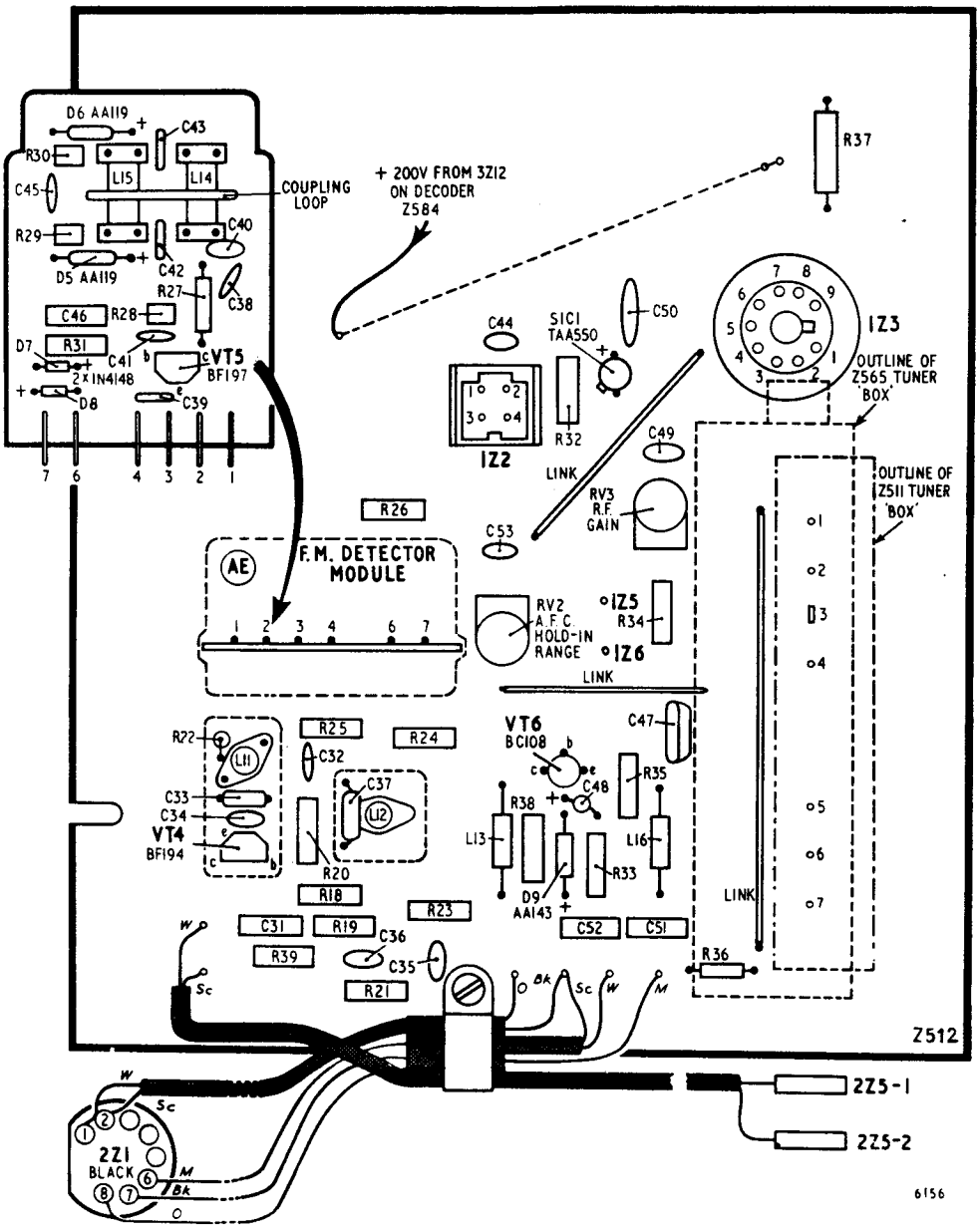
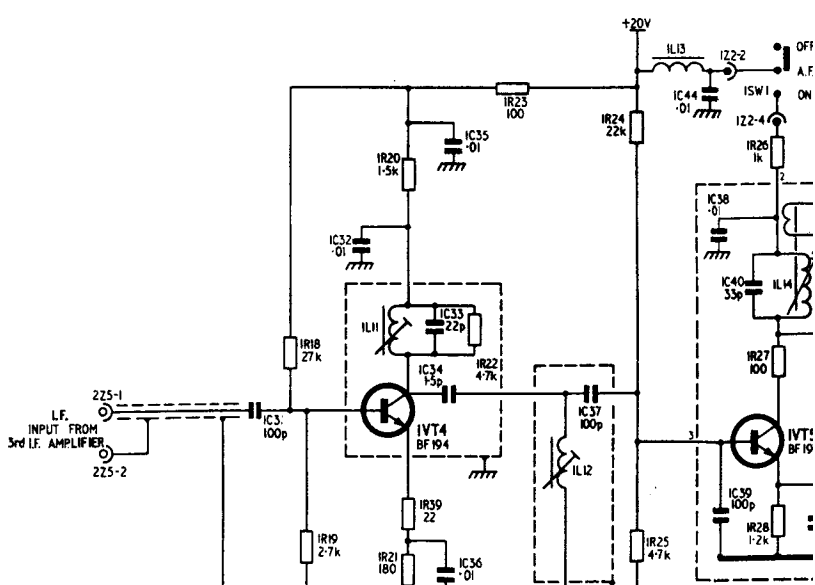
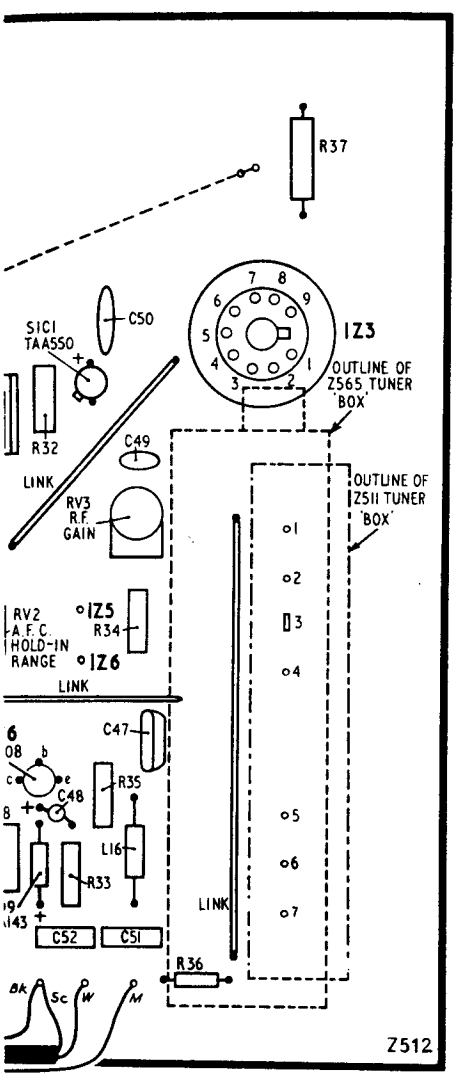


Fig. 3 Component Layout, A.F.C. and Power Supply panel, Z512





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r Supply panel, Z512

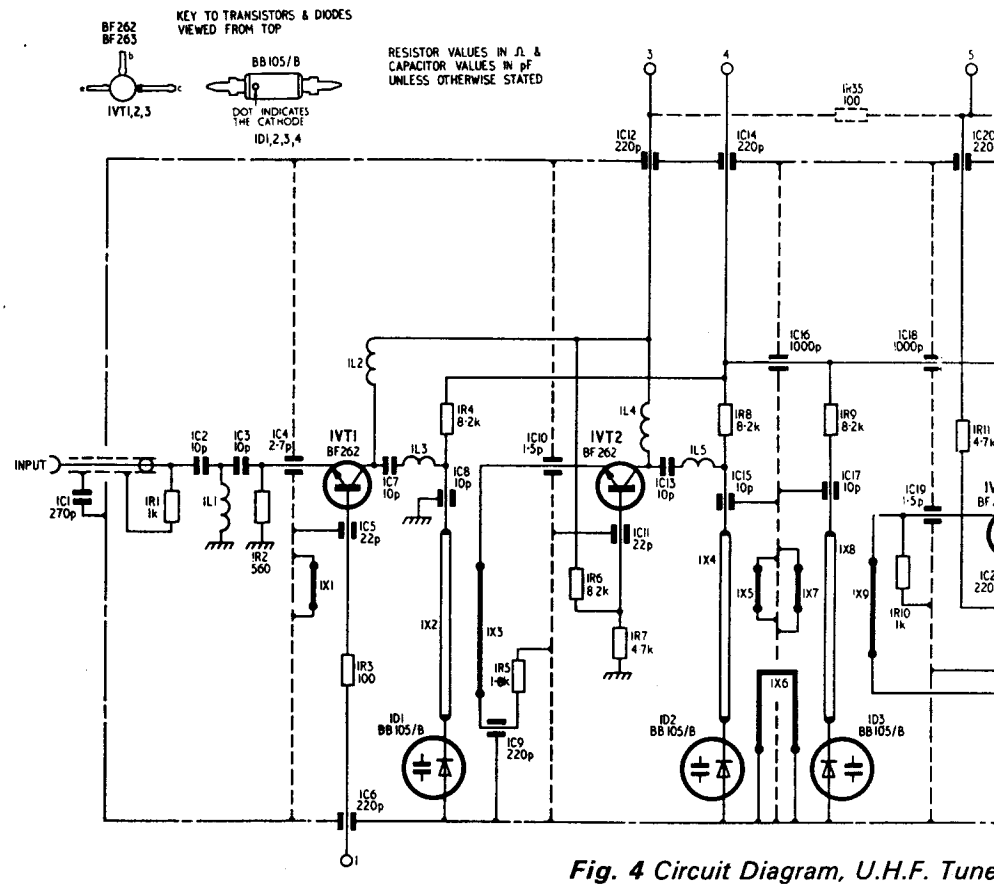

Fig. 4 Circuit Diagram, U.H.F. Tune

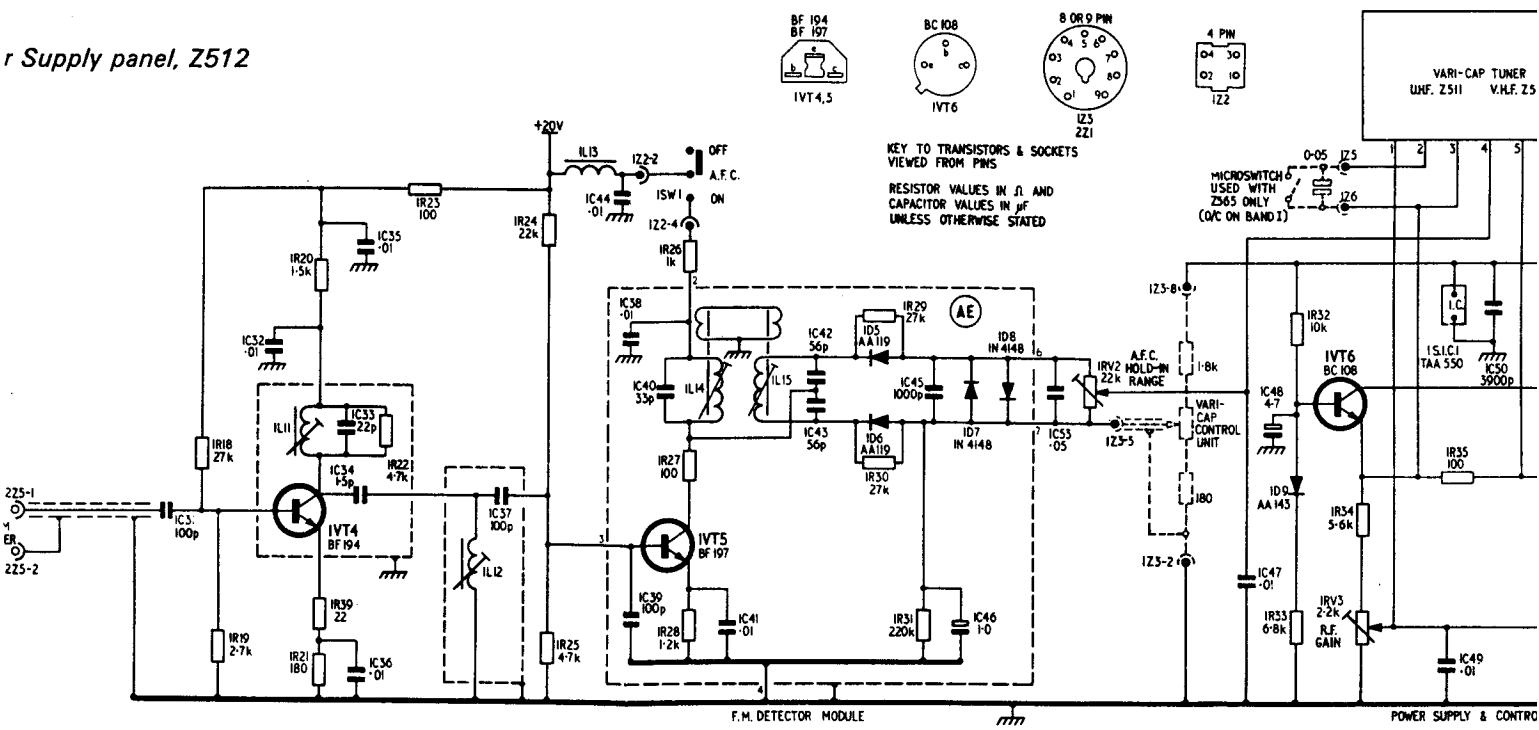

Fig. 5 Circuit Diagram, A.F.C. and Power Supply Panel,

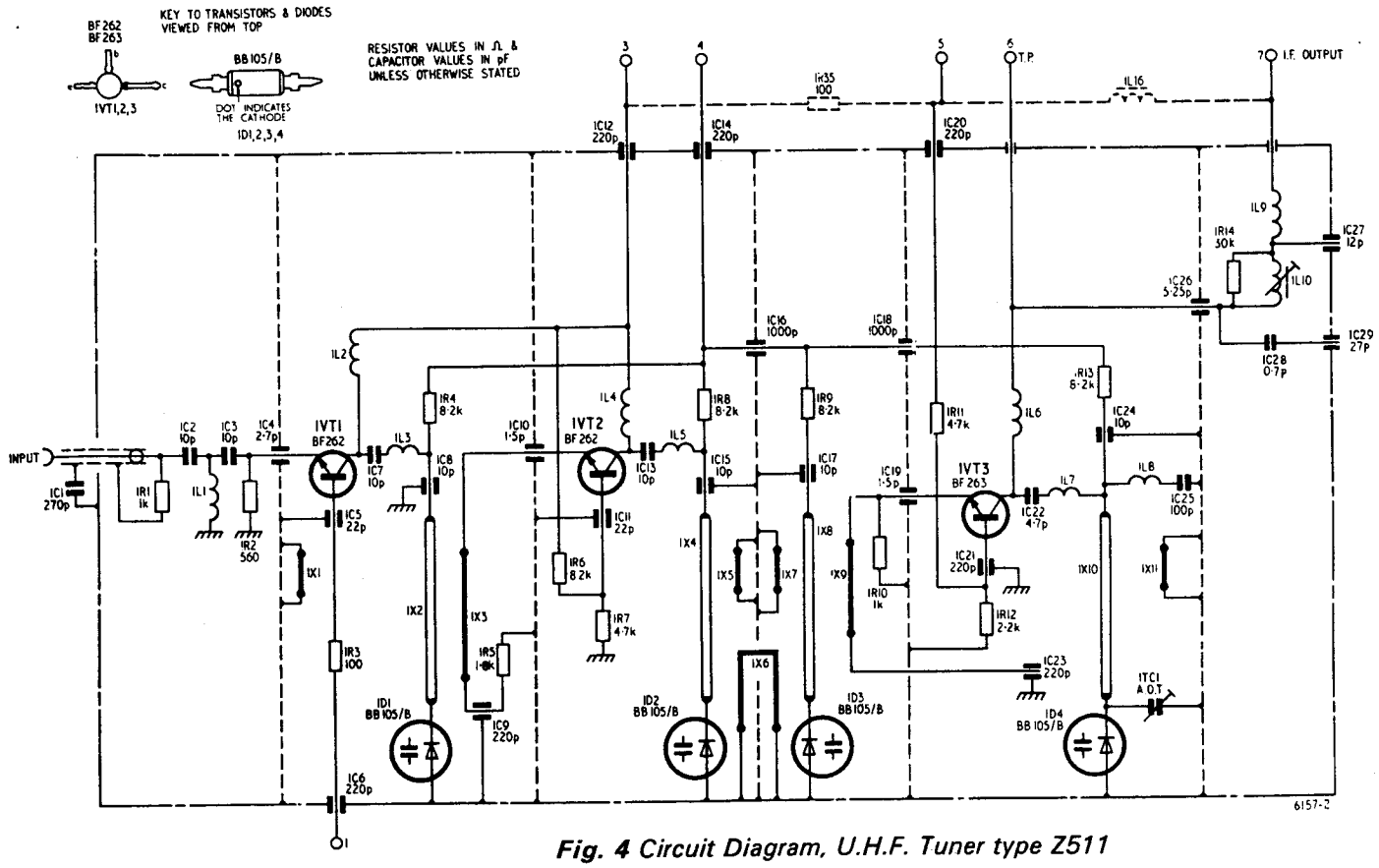

Fig. 4 Circuit Diagram, U.H.F. Tuner type Z511

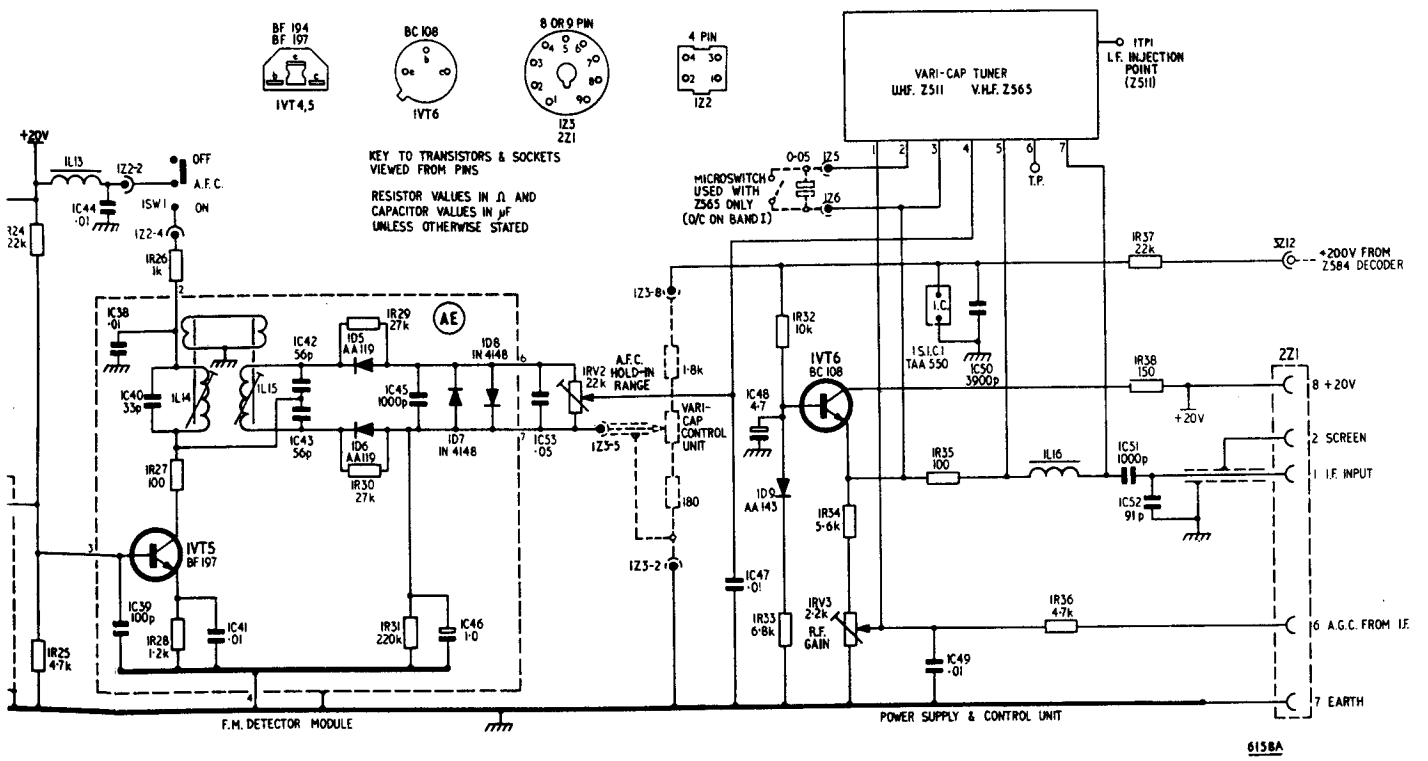

Fig. 5 Circuit Diagram, A.F.C. and Power Supply Panel, type Z512

Electrical Parts, Z511 U.H.F. Tuner Unit

Note: As the parts contained within the varicap tuner units are set in position during manufacture, any repositioning will adversely affect the performance of the units. Dealers are strongly advised not to attempt to service these units.

RESISTORS

Ref.	Value (ohms)	Tolerance (±%)	Rating (watts)	Part Number
1R1	1k	5	0·125	2052 1789
1R2	560	5	0·125	2052 1716
1R3	100	5	0·125	2052 1522
1R4	8·2k	5	0·125	2052 2022
1R5	1·8k	5	0·125	2052 1844
1R6	8·2k	5	0·125	2052 2022
1R7	4·7k	5	0·125	2052 1960
1R8	8·2k	5	0·125	2052 2022
1R9	8·2k	5	0·125	2052 2022
1R10	1k	5	0·125	2052 1789
1R11	4·7k	5	0·125	2052 1960
1R12	2·2k	5	0·125	2052 1868
1R13	8·2k	5	0·125	2052 2022
1R14	30k	5	0·125	2052 2162

CAPACITORS

Ref.	Value (pF)	Tolerance (±%)	Rating (volts)	Part Number
1C1	270	+40 −20	3kV	2541 0167
1C2	10	20	3kV	2505 1301
1C3	10	±0·5p	40	2057 0067
1C4	2·7	±0·5p	250	2599 0068
1C5	22	10	250	2599 0056
1C6	220	10	500	2541 0313
1C7	10	±0·5pF	40	6882 0008
1C8	10	10	250	2599 0044
1C9	220	20	250	2599 0019
1C10	1·5	±0·5pF	250	2599 0081
1C11	22	10	250	2599 0056
1C12	220	10	500	2541 0313
1C13	10	±0·5pF	40	6882 0008
1C14	220	10	500	2541 0313
1C15	10	10	250	2599 0044
1C16	1000	+80 −20	300	2541 0210
1C17	10	10	250	2599 0044
1C18	1000	+80 −20	300	2541 0210
1C19	1·5	±0·5pF	250	2599 0081

CAPACITORS—continued

Ref.	Value (pF)	Tolerance (±%)	Rating (volts)	Part Number
1C20	220	10	500	2541 0313
1C21	220	20	250	2599 0019
1C22	4·7	±0·5pF	40	6882 0021
1C23	220	20	250	2599 0019
1C24	10	10	250	2599 0044
1C25	100	20	250	2599 0093
1C26	5·25	±0·5pF	300	2541 0295
1C27	12	10	300	2541 0301
1C28	0·7	±0·25pF	500	2505 1349
1C29	27	10	500	2541 0337

DIODES, VARICAP

Ref.	Type	Function	Part Number
1D1	BB105/B	Pre-selector tuning	3645 0029
1D2	BB105/B	Bandpass filter (primary) tuning	3645 0029
1D3	BB105/B	Bandpass filter (secondary) tuning	3645 0029
1D4	BB105/B	Oscillator tuning	3645 0029

INDUCTORS

Ref.	Description	Part Number
1L1	Choke, high-pass filter	6811 0352
1L2	Choke	6811 0443
1L3	Choke/capacitor (1C7)	6882 0008
1L4	Choke	6811 0340
1L5	Choke/capacitor (1C13)	6882 0008
1L6	Choke	6811 0364
1L7	Choke/capacitor (1C22)	6882 0021
1L8	Choke, rejector	6811 0364
1L9	Choke	6811 0364
1L10	I.F. output coil	7100 4786

TRANSISTORS

Ref.	Type	Function	Part Number
1VT1	BF262	R.F. amplifier	3632 0341
1VT2	BF262		3632 0341
1VT3	BF263	Mixer/oscillator	3632 0328

Z512
A.F.C. and Power Supply Panel

RESISTORS

Ref.	Value (ohms)	Tolerance (±%)	Rating (watts)	Part Number
1R18	27k	5	0·25	2055 5908
1R19	2·7k	5	0·25	2055 5647
1R20	1·5k	10	0·2	2001 0722
1R21	180	5	0·25	2055 5337
1R22	4·7k	10	0·125	2052 0797
1R23	100	5	0·25	2055 5271
1R24	22k	5	0·25	2055 5878
1R25	4·7k	5	0·25	2055 5702
1R26	1k	10	0·2	2001 0709
1R27	100	10	0·125	2052 0566
1R28	1·2k	10	0·3	2037 0702
1R29	27k	10	0·3	2037 0878
1R30	27k	10	0·3	2037 0878
1R31	220k	10	0·2	2001 1003
1R32	10k	10	0·2	2001 0837
1R33	6·8k	10	0·2	2001 0813
1R34	5·6k	10	0·2	2001 0801
1R35	100	10	0·2	2001 0564
1R36	4·7k	10	0·125	2052 0797
1R37	22k	5	0·25	2055 1113
1R38	150	10	0·2	2001 0588
1R39	22	5	0·25	2055 5088

RESISTORS, VARIABLE

Ref.	Value (ohms)	Rating (watts)	Function	Part Number
1RV2	22k	0·2	A.F.C. hold-in range	2355 0053
1RV3	2·2k	0·2	R.F. gain	2355 0089

CAPACITORS

Ref.	Value (µF)	Value (pF)	Tolerance (±%)	Rating (volts)	Part Number
1C31		100	10	500	2525 0486
1C32	0·01		+80 −20	50	2566 0019
1C33		22	2·5	125	2653 1306
1C34		1·5	10		2555 0007
1C35	0·01		+80 −20	50	2566 0019
1C36	0·01		+80 −20	50	2566 0019
1C37		100	2·5	125	2653 0284
1C38	0·01		+80 −20	50	2566 0019
1C39		100	2		2557 0195
1C40		33	5		2556 0207
1C41	0·01		+80 −20	50	2566 0019
1C42		56	2		2557 0158
1C43		56	2		2557 0158
1C44	0·01		+80 −20	50	2566 0019
1C45		1000	20		2561 0193

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Rating (volts)	Part Number
500	2541 0313
250	2599 0019
40	6882 0021
250	2599 0019
250	2599 0044
250	2599 0093
300	2541 0295
300	2541 0301
500	2505 1349
500	2541 0337

	Part Number
	3645 0029
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	3645 0029

	Part Number
	6811 0352
	6811 0443
	6882 0008
	6811 0340
	6882 0008
	6811 0364
	6882 0021
	6811 0364
	6811 0364
	7100 4786

	Part Number
	3632 0341
	3632 0341
	3632 0328

on	Part Number
ıold-in range	2355 0053
in	2355 0089

Rating (volts)	Part Number
500	2525 0486
50	2566 0019
125	2653 1306
	2555 0007
50	2566 0019
50	2566 0019
125	2653 0284
50	2566 0019
	2557 0195
	2556 0207
50	2566 0019
	2557 0158
	2557 0158
50	2566 0019
	2561 0193

CAPACITORS

Ref.	Value (μF)	Value (pF)	Tolerance (±%)	Rating (volts)	Part Number
1C46	1·0				2751 0402
1C47	0·01		20	250	2601 0008
1C48	4·7		20	25	2759 0173
1C49	0·01		+80 −20	50	2566 0019
1C50		3900	20	500	2563 0040
1C51		1000	20	500	2535 0134
1C52		91	5		2701 0636
1C53	0·05		+80 −20	10	2566 0342

DIODES

Ref.	Type	Function	Part Number
1D5	AA119	F.M. detector diodes	3641 0020
1D6	AA119		3641 0020
1D7	1N4148	Clipping diodes.	3641 1601
1D8	1N4148		3641 1601
1D9	AA143	Temperature compensation diode	3641 1607

INTEGRATED CIRCUIT

Ref.	Type	Function
1S1C1	TAA550	Varicap supply stabilizer

INDUCTORS

Ref.	Function
1L11	Bandpass coil (collector)
1L12	Bandpass coil (output)
1L13	R.F. choke
1L14	F.M. detector coil primary
1L15	F.M. detector coil secondary
1L16	Rejector coil

TRANSISTORS

Ref.	Type	Function
1VT4	BF194	Narrow band i.f. amplifier
1VT5	BF197	F.M. detector driver
1VT6	BC108	Voltage regulator

Mechanical Parts

Item	Part
Aerial socket moulding and lead	75
A.F.C. and Power Supply panel Z512 complete but less tuner	73
Contacts (5), for socket 2Z1	34
Contacts (3), for sockets 2Z5–1, 2 and 3Z12	34
Core, (2) iron dust, for coils 1L11, 12	32
Core, iron dust, for coil 1L14	32
Core, iron dust, for coil 1L15	32
Microswitch, used on Z564 conversion kit	34
Module ***AE***, F.M. Detector, complete	72
Plug, 4 pin, black 1Z2	34
Plug, 9 pin, white, 1Z3	34
Socket moulding, for 2Z1, less contacts	34
Socket moulding (3), for 2Z5–1, 2 and 3Z12, less contacts	34
Tuner, Z511 complete	73
Tuner, Z565 complete	73

MODIFICATIONS

INTEGRATED CIRCUIT

Ref.	Type	Function	Part Number
1S1C1	TAA550	Varicap supply stabilizer	3646 0175

INDUCTORS

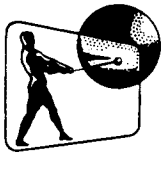
Ref.	Function	Part Number
1L11	Bandpass coil (collector)	7100 4737
1L12	Bandpass coil (output)	7100 4749
1L13	R.F. choke	7100 1797
1L14	F.M. detector coil primary	7100 4713
1L15	F.M. detector coil secondary	7100 4725
1L16	Rejector coil	7100 0070

TRANSISTORS

Ref.	Type	Function	Part Number
1VT4	BF194	Narrow band i.f. amplifier	3632 0171
1VT5	BF197	F.M. detector driver	3632 0195
1VT6	BC108	Voltage regulator	3632 0201

	Part Number
. . . . .	7500 4458
but less tuner	7300 3815
. . . . .	3439 0121
. . . . .	3439 0066
. . . . .	3242 0080
. . . . .	3242 0134
. . . . .	3242 0122
. . . . .	3416 0139
. . . . .	7200 1719
. . . . .	3431 0642
. . . . .	3431 0629
. . . . .	3435 0019
;s contacts	3439 0145
. . . . .	7300 3797
. . . . .	7300 3943

THE SERVICE DEPARTMENT



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